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SUMMARY

Equations for the determination of particle flux at a location downstream of the exit of convergent and divergent two-dimensional slots for gas flow through the slot under free-molecule conditions have been derived and solved numerically. Slot configurations range from length to inlet width ratios of 0.25 to 8 and wall half-angles from 75° divergent to 60° convergent.

Flux distribution patterns along surfaces of constant radius from the slot exit centerplane and in planes normal to the slot centerplane are presented for varying distances from the slot exit. Flux along the centerplane close to the slot exit is higher for the smaller length-to-width-ratio slots and becomes less a function of the length to inlet width ratio as the distance from the slot exit increases. As the length to inlet width ratio of the slot increases, the angle giving maximum flux along the centerplane approaches zero (i.e., a parallel-walled slot). A maximum value of flux along the centerplane is obtained in the far field with divergent slots.

Larger length-to-inlet-width-ratio slots give a more collimated beam than do small length to inlet width ratios, and a divergent slot yields a more collimated beam than a convergent slot having the same length to inlet width ratio. The normalized flux patterns for the convergent and divergent slots in the far field follow the cosine distribution law out to angles from the centerplane equal in magnitude to the wall half-angle; beyond this angle the normalized flux falls below the cosine distribution law.

INTRODUCTION

The gas flow patterns that are obtained from the exit of nozzles or orifices under free-molecule-flow conditions are frequently required in the design of electrostatic thrustors (refs. 1 to 5). Such patterns may also have applicability to a wide range of flow problems in vacuum and space technology. Analytical or experimental determinations of gas profiles under free-molecule-flow conditions have been very limited. Clausing (ref. 6) calculated the far-field flux patterns for flow through short cylindrical tubes (length to radius ratios less than 2). More recently, in reference 7, his analysis has been

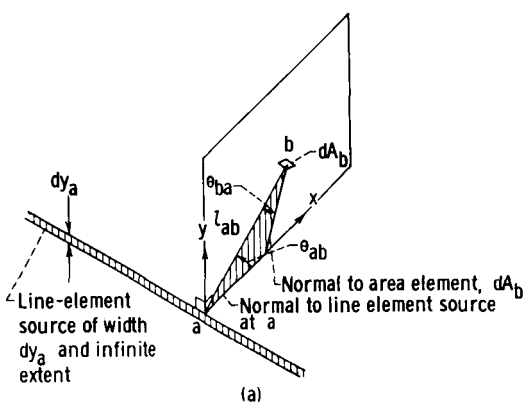
extended to include larger length to radius ratios. An experimental determination of far-field gas profiles from cylindrical tubes is given in reference 8.

The present report deals with flux distribution patterns resulting from gas flow under free-molecule conditions with diffuse wall reflection through divergent, convergent, and parallel-walled slots, which are two-dimensional (i.e., infinite in extent in a direction normal to the flow direction). The slot configurations, shown schematically in figure 1(a), vary in length to inlet width ratio from 0.25 to 8, and have wall half-angles from 75° divergent to 60° convergent. Two types of flux patterns are presented as shown in figure 1(b). In one, the angular distribution of flux is calculated for various radial distances with the origin taken to be on the centerplane at the exit plane of the slot. In the other, the lateral flux variation normal to the centerplane is determined for planes located at various distances from the slot exit plane. Both distributions are needed because the flux through two differential areas located at the same point, but at some angle to each other, cannot be simply related except at distances far from the slot exit. In each case the flux patterns were evaluated close to the slot exit and for continually increasing distances until the far field is reached. The far field is defined herein to mean that region (or, distance) where the normalized flux patterns become independent of the distance from the slot exit.

The relations for free-molecule flow presented herein are also applicable to certain radiation problems with diffuse reflection, since the flux of emitted radiation then follows the cosine distribution law and the geometric relations become identical to those for molecular flow.

CALCULATION PROCEDURE

The flux distribution downstream from the exit of the slots is calculated under the assumptions that gas flow into the slot is uniform and has a random directional distribution, that free-molecule-flow conditions exist throughout, and that particle reflections from the wall are diffuse. The relation from which the flux distributions are calculated is readily derived from the well-known cosine distribution law of emission from a line-element source (ref. 9). The relation is



$$dn_b = \frac{n_a \cos \theta_{ab} \cos \theta_{ba}}{2 l_{ab}} dy_a \qquad (1)$$

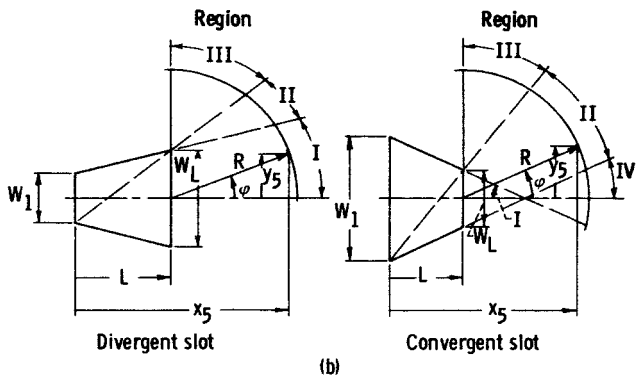
(All symbols are defined in appendix A.) The geometric parameters given in equation (1) are shown in sketch (a) where

dn_b flux (particles per unit area per unit time) arriving at differential area dA_b from the line-element source dy_a

n_a flux leaving strip, dy_a

Flux Distribution on Surfaces of Constant Radius About Centerline of Exit Plane

Mathematical description of the flux along various radii R beyond the slot exit depends on the regions as noted in sketch (b) and figure 1(c). The regions are symmetrical about the slot centerplane.



(b)

In region I, flux is due to contributions from all of the inlet and from both walls. In region II, flux is from only one wall and from only part of the inlet. In region III, there is no direct flux from the inlet, only flux from all or part of the one wall. In region IV, there is direct flux from part of the inlet opening and no flux from either wall. Region IV occurs only for the convergent slots in planes that are beyond the point of intersection of the extension of the planes of the walls. The flux equations that apply for the various regions are presented next; derivations of these equations are given in appendix B.

Region I. - Region I is bounded by the relation

$$0 \le \bar{y}_5 \le \frac{\bar{W}_L}{2} + (\bar{x}_5 - \bar{L}) \tan \beta \tag{2}$$

The flux at point 5 in the radial direction φ is given by

$$\frac{n_5(\varphi)}{n_1} = \frac{1}{2\bar{R}}\left\{\frac{\left[(\bar{x}_5 - \bar{L})(1 - 2\bar{y}_5) + 2\bar{x}_5\bar{y}_5\right]}{\sqrt{4\bar{x}_5^2 + (1 - 2\bar{y}_5)^2}} + \frac{\left[(\bar{x}_5 - \bar{L})(1 + 2\bar{y}_5) - 2\bar{x}_5\bar{y}_5\right]}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}}\right\}$$

$$+ \int_0^{\bar{L}} \frac{n(\bar{x}_3)}{n_1}\left\{\frac{(1 + 2\bar{y}_5 + 2\bar{x}_5 \tan\beta)\left[(1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)\sin\varphi + 2(\bar{x}_5 - \bar{x}_3)\cos\varphi\right]}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right.$$

$$\left. + \frac{(1 - 2\bar{y}_5 + 2\bar{x}_5 \tan\beta)\left[(1 - 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)\sin\varphi + 2(\bar{x}_5 - \bar{x}_3)\cos\varphi\right]}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 - 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \tag{3}$$

The first term in equation (3) is the direct flux from the inlet; the integral is the flux from the two walls.

Region II. - Region II is bounded by the relation

$$\frac{\bar{W}_L}{2} + (\bar{x}_5 - \bar{L}) \tan \beta \le \bar{y}_5 \le \frac{\bar{W}_L}{2} + \frac{\bar{x}_5 - \bar{L}}{2}\left(\frac{\bar{W}_L + 1}{\bar{L}}\right) \tag{4}$$

The flux relation is

$$\frac{n_5(\varphi)}{n_1} = \frac{1}{2\bar{R}}\left[\frac{(\bar{x}_5 - \bar{L})(\bar{y}_1' - \bar{y}_5) + \bar{x}_5\bar{y}_5}{\sqrt{\bar{x}_5^2 + (\bar{y}_1' - \bar{y}_5)^2}} + \frac{(\bar{x}_5 - \bar{L})(1 + 2\bar{y}_5) - 2\bar{x}_5\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}}\right] + \int_0^{\bar{L}} \frac{n(\bar{x}_3)}{n_1}$$

$$\times\left\{\frac{(1+ 2\bar{y}_5 + 2\bar{x}_5 \tan\beta)\left[(1+ 2\bar{y}_5+ 2\bar{x}_3 \tan\beta) \sin\varphi + 2(\bar{x}_5 - \bar{x}_3) \cos\varphi\right]}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \qquad (5)$$

where

$$\bar{y}_1' = \frac{\bar{W}_L}{2} - \left[\frac{\bar{y}_5 - (\bar{W}_L/2)}{\bar{x}_5 - \bar{L}}\right]\bar{L}$$

Region III. - Region III is bounded by the relation

$$\bar{R} \geq \bar{y}_5 \geq \frac{\bar{W}_L}{2} + \frac{\bar{x}_5 - \bar{L}}{2}\left(\frac{\bar{W}_L + 1}{\bar{L}}\right) \qquad (6)$$

In region III there is no contribution from the inlet. The flux at point 5 is entirely from one wall and is given by the relation

$$\frac{n_5(\varphi)}{n_1} = \int_{\bar{x}_3'}^{\bar{L}} \frac{n(\bar{x}_3)}{n_1}$$

$$\times\left\{\frac{(1+ 2\bar{y}_5+ 2\bar{x}_5 \tan\beta)\left[(1+ 2\bar{y}_5+ 2\bar{x}_3 \tan\beta) \sin\varphi + 2(\bar{x}_5 - \bar{x}_3) \cos\varphi\right]}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \qquad (7)$$

where the limit $\bar{x}_3'$ is given by the relation

$$\bar{x}_3' = \frac{1}{1 + \left[\frac{\bar{x}_5 - \bar{L}}{\bar{y}_5 - (\bar{W}_L/2)}\right]\tan\beta}\left\{\bar{L} - \left[\frac{\bar{x}_5 - \bar{L}}{\bar{y}_5 - (\bar{W}_L/2)}\right]\left[\frac{\bar{W}_L + 1}{2}\right]\right\} \qquad (8)$$

Region IV. - Region IV occurs only for the convergent slots when

$$\bar{x}_5 > \frac{1}{2|\tan \beta|} \tag{9}$$

For this condition, the bounds of region IV are given by the relation

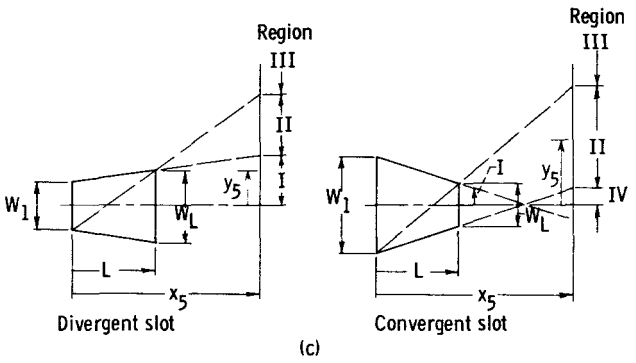
$$0 \leq \tan \varphi \leq |\tan \beta| - \frac{\bar{W}_L \sec \varphi}{2\bar{R}} \tag{10}$$

The flux at point 5 is then given by

$$\frac{n_5(\varphi)}{n_1} = \frac{\bar{W}_L}{4\bar{R}} \left\{ \frac{1}{\sqrt{1+\left[(\bar{W}_L/2\bar{R}) \sec \varphi - \tan \varphi\right]^2}} + \frac{1}{\sqrt{1+\left[(\bar{W}_L/2\bar{R}) \sec \varphi + \tan \varphi\right]^2}} \right\} \tag{11}$$

Flux Distributions in Planes Beyond Exit

Flux variations in planes beyond the exit are also divided into four regions as noted in sketch (c) and figure 1(d).



(c)

In region I, flux is due to contributions from all of the inlet and from both walls. In region II, flux is from all of one wall and from part of the inlet. In region III, there is no direct flux from the inlet, and only flux from all or part of the one wall is "seen" by the point 5. In region IV, there is direct flux from part of the inlet only; there is no direct flux from either wall. Region IV occurs only for the convergent cases in planes that are beyond the point of intersection of the extension of the planes of the walls. The flux equations that apply for the various regions are given next; derivations are given in appendix B.

Region I. - The boundary of region I is determined by the relation

$$0 \leq \bar{y}_5 \leq \frac{\bar{W}_L}{2} + (\bar{x}_5 - \bar{L}) \tan \beta \tag{12}$$

The flux at point 5 is given by the following expression:

$$\frac{n_5(\bar{y}_5)}{n_1} = \frac{1}{2}\left[\frac{1 - 2\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 - 2\bar{y}_5)^2}} + \frac{1 + 2\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}}\right]$$

$$+ 2\int_0^{\bar{L}} \frac{n(\bar{x}_3)}{n_1}(\bar{x}_5 - \bar{x}_3)\left\{\frac{1 + 2\bar{y}_5 + 2\bar{x}_5 \tan\beta}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right.$$

$$\left. + \frac{1 - 2\bar{y}_5 + 2\bar{x}_5 \tan\beta}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 - 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \qquad (13)$$

The first term of equation (13) represents flux direct from the opening; the integral represents flux from the walls.

Region II. - Region II is bounded by the relation

$$\frac{\bar{W}_L}{2} + (\bar{x}_5 - \bar{L}) \tan\beta \le \bar{y}_5 \le \frac{\bar{W}_L}{2} + \frac{\bar{x}_5 - \bar{L}}{2}\left(\frac{\bar{W}_L + 1}{\bar{L}}\right) \qquad (14)$$

The flux at point 5 is given by the relation

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2}\left[\frac{\bar{y}_1' - \bar{y}_5}{\sqrt{\bar{x}_5^2 + (\bar{y}_1' - \bar{y}_5)^2}} + \frac{1 + 2\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}}\right]$$

$$+ 2\int_0^{\bar{L}} \frac{n(\bar{x}_3)}{n_1}(\bar{x}_5 - \bar{x}_3)\left\{\frac{1 + 2\bar{y}_5 + 2\bar{x}_5 \tan\beta}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \qquad (15)$$

Region III. - Region III is determined by the relation

$$\bar{y}_5 \ge \frac{\bar{W}_L}{2} + \frac{\bar{x}_5 - \bar{L}}{2}\left(\frac{\bar{W}_L + 1}{\bar{L}}\right) \qquad (16)$$

The flux at point 5 is given by

$$\frac{n_5(\bar{y}_5)}{n_1} = 2\int_{\bar{x}_3'}^{\bar{L}} \frac{n(\bar{x}_3)}{n_1}\,(\bar{x}_5 - \bar{x}_3)\left\{\frac{1 + 2\bar{y}_5 + 2\bar{x}_5 \tan\beta}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \qquad (17)$$

where the limit $\bar{x}_3'$ is given by

$$\bar{x}_3' = \frac{1}{1 + \left[\dfrac{\bar{x}_5 - \bar{L}}{\bar{y}_5 - (\bar{W}_L/2)}\right]\tan\beta}\left\{\bar{L} - \left[\frac{\bar{x}_5 - \bar{L}}{\bar{y}_5 - (\bar{W}_L/2)}\right]\left[\frac{\bar{W}_L + 1}{2}\right]\right\} \qquad (18)$$

Since there is no direct flux contribution from the inlet, equation (17) represents only flux from the one wall.

Region IV. - Region IV occurs for the convergent case when the location of the plane $\bar{x}_5$ is beyond the point of intersection of the extension of the side walls; that is, for

$$\bar{x}_5 > \frac{1}{2|\tan\beta|} \qquad (19)$$

where $|\tan\beta|$ is the absolute value of the tangent of β, the half-angle of convergence. In plane $\bar{x}_5$ then, the limit for region IV is

$$0 \leq \bar{y}_5 \leq \bar{x}_5|\tan\beta| - \frac{1}{2} \qquad (20)$$

The flux at point 5 in region IV is given by

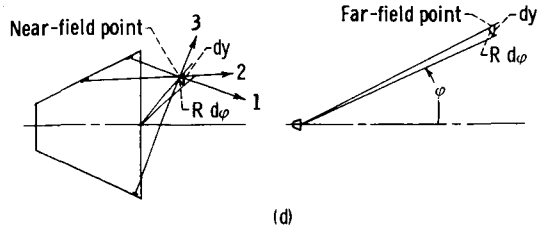
$$\frac{n_5(\bar{y}_5)}{n_1} = \frac{1}{2}\left[\frac{\bar{W}_L - 2\bar{y}_5}{\sqrt{4(\bar{x}_5 - \bar{L})^2 + (\bar{W}_L - 2\bar{y}_5)^2}} + \frac{\bar{W}_L + 2\bar{y}_5}{\sqrt{4(\bar{x}_5 - \bar{L})^2 + (\bar{W}_L + 2\bar{y}_5)^2}}\right] \qquad (21)$$

The foregoing series of equations for the radial and plane flux values were programed for solution on an IBM 7094 computer. Values of the wall flux $n(\bar{x}_3)/n_1$ required for the numerical integrations were obtained from reference 10.

Relation Between Radial and Plane Flux

Since the total particle flux through a small area is the summation of contributions from the various inlet and wall areas, it can be seen from

sketch (d) that, near the slot exit (i.e., in the near field), there is no simple relation between the total flux through two differential areas located at the same point (x_5, y_5) but at some angle to each other. For instance, particle trajectories labeled 1 and 2 in sketch (d) pass through the differential area dy but not through the differential area R dφ. On the other hand, particle trajectory 3 passes through area R dφ but not through dy. Thus, the near-field flux through R dφ and dy are not simply related. Far from the slot exit (i.e., in the far field), however, particle trajectories that pass through area R dφ also pass through dy. Since the area dy is related to the area R dφ by



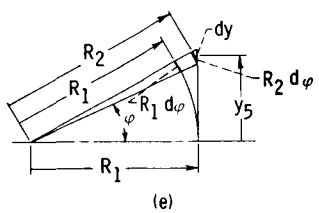
(d)

$$R\, d\varphi = dy \cos \varphi \tag{22}$$

the radial flux in the far field is simply related to the plane flux at the same point. The relation is

$$n(y) = n(\varphi) \cos \varphi \tag{23}$$

Another far-field relation may be developed from the geometric quantities shown in sketch (e). From the sketch it can be seen that $R_1/R_2 = \cos \varphi$ and $dy \cos \varphi = R_2\, d\varphi$, so that $R_1\, d\varphi = \cos^2\varphi\, dy$. Thus, the flux through a point on the plane $x - L$ is related to the radial flux at the same angle, for $R_1 = x - L$, by the equation



(e)

$$\left[n(y_5)\right]_{x-L} = \left[n(\varphi)\right]_{R_1=x-L} \cos^2\varphi \tag{24}$$

Centerplane Flux Parameter

A parameter that is useful in indicating the approach of the centerplane flux (i.e., at $\varphi = y_5 = 0$) to its far-field value is the product $\bar{R}\left[n_5(0)/n_1\right]$. The asymptotic value of $n_5(0)/n_1$, obtained from equation (3), or (13), as x_5 becomes large is (for region I)

$$\left[\frac{n_5(0)}{n_1}\right]_{\bar{x}_5 \gg \bar{L}} = \frac{1}{2\bar{R}}\left[1 + 2\bar{L} \tan \beta \frac{\hat{n}(\bar{x}_3)}{n_1}\right] \tag{25}$$

where $\hat{n}(\bar{x}_3)/n_1$ is the average wall flux; that is,

$$\frac{\hat{n}(\bar{x}_3)}{n_1} = \frac{1}{\bar{L}} \int_0^{\bar{L}} \frac{n(\bar{x}_3)}{n_1} \, d\bar{x}_3 \tag{26}$$

For divergent or parallel-walled slots, equation (25) becomes

$$\bar{R}\left[\frac{n_5(0)}{n_1}\right]_{\bar{x}_5 \gg \bar{L}} = \frac{1}{2}\left[1 + 2\bar{L} \tan \beta \, \frac{\hat{n}(\bar{x}_3)}{n_1}\right] \tag{27}$$

For the convergent slot, where the centerplane in the far field is located in region IV, the asymptotic value of $n_5(0)/n_1$ becomes (refer to eq. (11) or (21))

$$\left[\frac{n_5(0)}{n_1}\right]_{\bar{x}_5 \gg \bar{L}} = \frac{1}{2} \frac{\bar{W}_L}{\bar{R}} \tag{28}$$

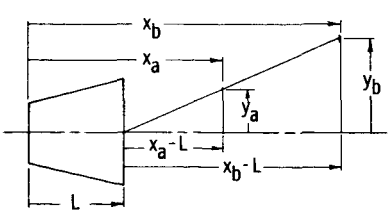
or

$$\bar{R}\left[\frac{n_5(0)}{n_1}\right]_{\bar{x}_5 \gg \bar{L}} = \frac{\bar{W}_L}{2} \tag{29}$$

RESULTS AND DISCUSSION

The calculated angular distributions of particle flux at various radial distances from the slot exit are presented in table I. Values of flux on the centerplane ($\varphi = 0$) are given in terms of the ratio to the inlet flux $[n(0)/n_1]$, while values at angles φ other than zero are normalized to the value on the centerplane at the same radius $n(\varphi)/n(0)$.

The calculated distributions of particle flux at various distances from the centerplane, in planes located at several distances downstream from the slot exit, are presented in table II. As in table I, values of flux on the centerplane ($y = 0$) are given in terms of inlet flux $n(0)/n_1$, while values at distances y other than zero, are normalized to the value on the centerplane in the same plane $n(y)/n(0)$. It will be noted that the y-coordinate listing in the table is given as the ratio $y/(x - L)$. This parameter was chosen because a particular value of $y/(x - L)$ corresponds to the same angle from the centerplane regardless of the location of the plane downstream from the slot exit (see sketch (f)). In the far field, the normalized flux $n(y)/n(0)$ at a particular value of $y/(x - L)$ is independent of downstream distance.



(f)

Flux Distribution Along Centerplane

Values of the flux along the centerplane $n(0)/n_1$ obtained from either table I or II are shown for the various configurations in figures 2 to 4. In figure 2, values are shown for parallel-walled slots ($\beta = 0$) of various length to inlet width ratios, L/W_1. Near the exit, the flux is highest for the lower values of L/W_1. As the distance from the slot exit increases, the flux becomes less dependent on L/W_1 and approaches the theoretical value $\left[\frac{n(0)}{n_1} = \frac{1}{2\bar{R}}\right]$ obtained for a slit source at large distances from the source.

The variation of flux with distance from the slot exit for $L/W_1 = 4$ is shown for various wall half-angles in figure 3. Close to the slot exit the flux is higher for the less divergent wall half-angles, β. Also, it is apparent that the flux from various slots does not approach the same limit in the far field. The lower line of figure 3 shows the direct flux contribution from the slot inlet, that is, the flux that has arrived at the centerplane without having had a collision with the slot wall. The 75° divergent slot has centerplane flux values nearly equal to those obtainable from the inlet directly, indicating that the contribution from the walls is very small for wall half-angles of this magnitude or greater. It is also apparent from figure 3 that at any particular distance from the exit of a slot there is a particular wall half-angle that will give a maximum value of the flux $n(0)/n_1$. This feature is shown more clearly in figure 4, wherein centerplane flux is plotted as a function of wall half-angle for various distances from the slot exit for all the length to width ratios examined. The wall half-angle that yields the maximum flux increases (i.e., is more divergent) as the distance from the slot exit increases; however, the maximum is not very pronounced at large wall half-angles.

Shown in figure 5 are some typical variations of the product $\bar{R}\left[n(0)/n_1\right]$ with distance downstream. The value of $\bar{R}\left[n(0)/n_1\right]$ approaches its far-field limit more rapidly for smaller values of L/W_1 (fig. 5(a)) and for the less divergent slots (fig. 5(b)).

The far-field limiting values of the flux parameter $\bar{R}\left[n(0)/n_1\right]$ may be calculated from equations (27) and (29). Values of the average wall flux $\hat{n}(x_3)/n_1$, required in equation (27), were calculated from the wall flux distributions in reference 10 and are shown in figure 6.

The resulting far-field limiting values of $\bar{R}\left[n(0)/n_1\right]$ are shown in figure 7 as functions of L/W_1 and β. The maximum value at any particular radius $\bar{R}$ is obtained with divergent slots.

Far-Field Flux Distributions

Some typical variations in the far-field flux patterns of the different slot configurations are shown in figures 8 to 10. In figure 8, results are shown for parallel-walled slots of various length to width ratios. A beam-

collimation effect resulting from increasing L/W_1 is apparent.

The far-field radial flux patterns for 20° divergent and 20° convergent slots are shown in figures 9(a) and (b), respectively, for various length to width ratios. The discontinuities in slope of these curves occur at the boundaries at the three different flux regions. The normalized flux follows the cosine distribution law out to the angle $\varphi = |\beta|$. Beyond this angle, the flux drops below the cosine pattern. Again, the longer the slot, the more collimated is the resulting beam. The divergent slot results in a more collimated beam than the convergent slot.

The far-field flux patterns for a particular length to width ratio ($L/W_1 = 1$), and various angles of divergence and convergence are shown in figures 10(a) and (b). Again, the flux pattern follows the cosine distribution law out to the angle $\varphi = |\beta|$ and drops below the cosine pattern more rapidly for the divergent than for the convergent configurations.

The representative plots thus far presented have been radial flux patterns. As shown in equation (23), the radial and plane flux values at a point are simply related to each other in the far field. Similarly, values of $n(\bar{y})$ and $n(\varphi)$ for $\bar{x} - \bar{L} = \bar{R}$ are simply related as shown by equation (24). Compared in figure 11 are far-field values of the flux $n(\varphi)/n(0)$ obtained by direct calculation (table I) and as determined from equation (24). The excellent agreement shows that the tabulated values were made out to large enough distances to be in the far field at all angles from the slot centerplane.

Near-Field Flux Distributions

Some illustrative flux distribution patterns in the near field are shown in figures 12 to 14. Radial flux patterns for the parallel-walled slot of length to inlet width ratio of 8 are shown in figure 12. An abrupt change in the slope of the flux curve is apparent at the boundary between regions I and II. The small maximum in radial flux curve at $\varphi > 0$ for a small $\bar{R}$ was unexpected, but its existence is verified by differentiation of equation (3) for the case of $\beta = 0$. This yields the relation

$$\left[\frac{d\left(\frac{n_5(\varphi)}{n_1}\right)}{d\varphi}\right]_{\varphi=0} = \int_0^{\bar{L}} \frac{n(\bar{x}_3)}{n_1} \frac{2}{\left[4(\bar{L} + \bar{R} - \bar{x}_3)^2 + 1\right]^{3/2}} d\bar{x}_3$$

which shows that the slope is small but positive at $\varphi = 0$ and approaches zero as the radius increases. The flux in planes at varying distance from the slot exit for this same configuration are shown in figure 12(b). This figure shows clearly the large variation in flux distribution as distance downstream from the exit is varied.

Near-field flux patterns for a convergent slot of $L/W_1 = 1$ and $\beta = -20^\circ$

are shown in figures 14(a) and (b). The behavior of the patterns for this convergent case differs from that for the divergent slot shown in figure 13. Within the angle $\varphi \leq |\beta|$, the normalized flux (fig. 14(a)) drops below its final far-field value and then rises, while for the divergent slot (fig. 13(a)) the relative flux continuously approaches the far-field value. Comparison of figures 13(b) and 14(b) also shows that, for a range of $y/(x - L)$ values, the flux distributions are much more widely spread for the divergent slot than for the convergent slot.

Other Considerations

The directivity of the molecular beams emerging from slots of different L/W_1 ratios is illustrated in figure 15, which shows the far-field flux patterns for divergent slots with $\beta = 20^\circ$ and varying L/W_1 values. The curves are different from those of figure 9(a) in that the flux from the zero-length slot is used as the reference for all the relative flux values, so that a true comparison of the relative flux is obtained when the inlet flux density is the same.

A similar comparison for slots of $L/W_1 = 4$ and varying wall half-angles is shown in figure 16. The highest flux in the central portion of the beam is obtained with a wall half-angle of about 20°. However, the 10° and 30° wall half-angles are only slightly below this maximum flux level. The trend for other L/W_1 slots would be similar, with the maximum flux occurring at slightly different wall half-angles as illustrated in figure 7.

CONCLUDING REMARKS

Equations for the determination of particle flux at a location downstream from the exit of convergent and divergent two-dimensional slots under free-molecule conditions have been derived and solved numerically. Slot configurations include length to inlet width ratios from 0.25 to 8 and wall half-angles from 75° divergent to 60° convergent. Flux distribution patterns at various distances from the slot exit are presented. Patterns are calculated in two ways: (1) variation with angle at constant radius, and (2) variation with distance from the centerplane in a plane normal to the flow direction.

From typical illustrative plots of the calculations, the following features of the particle flux were evident:

(1) Values of flux along the centerplane for the parallel-walled slots are highest for small length-to-width-ratio slots initially and become less a function of the length to inlet width ratio as the distance from the slot increases.

(2) There is a particular wall half-angle that yields a maximum in the centerplane flux at a given distance from the slot exit. This angle becomes more divergent as the distance from the slot increases; however, the flux is not sensitive to wall half-angle variations at the larger distances.

(3) Far-field limiting values of the function $\bar{R}[n(0)/n_1]$ are approached in shorter distances the smaller the length to inlet width ratio of the slot and the more convergent the slot.

(4) The beam is more collimated the larger the length to inlet width ratio of the slot.

(5) A divergent slot yields a more collimated beam than a convergent slot of the same length to inlet width ratio and the same wall half-angle.

(6) Far-field distribution patterns of both convergent and divergent slots follow the cosine distribution law out to angles equal to the wall half-angle and then drop below the cosine law pattern.

Lewis Research Center
National Aeronautics and Space Administration
Cleveland, Ohio, June 12, 1964

APPENDIX A

SYMBOLS

A	area
L	length of configuration
l	length of line
n	flux or arrival rate, number/(area)(time)
$\hat{n}(\bar{x}_3)/n_1$	average wall flux
R	radial distance
W_1	inlet width of slot
W_L	exit width of slot
x	axial distance from slot inlet
y	lateral distance from slot centerplane
y_1'	upper limit lateral distance from slot centerplane in plane of opening (see sketch (i))
y_1''	lower limit lateral distance from slot centerplane in plane of opening (see sketch (i))
β	half-angle of slot; positive for diverging and negative for converging slot
θ	angle between surface normal and line
φ	angle between R and slot centerplane

Subscripts:

a,b	general points
in	inlet
w	wall
1	inlet plane
2,3	wall
4	exit plane

5 beyond exit plane

Superscript:

$(\bar{})$ nondimensionalized quantity, divided by W_1, the inlet slot width

APPENDIX B

DERIVATION OF FLUX RELATIONS

The equation from which all flux relations herein are derived is the differential line-element source relation:

$$dn_b = \frac{n_a \cos \theta_{ab} \cos \theta_{ba}}{2l_{ab}} dy_a \tag{B1}$$

As illustrated in sketches (c) and (d) there are four possible regions in which a point, at which the flux is to be determined, may lie. The flux equation is different for each region and for different orientations of the flux area.

Radial Flux Relations

I. Refer to figure 1(c). Point 5 is in region I, which is bounded by

$$0 \leq \bar{y}_5 \leq \frac{\bar{W}_L}{2} + (\bar{x}_5 - \bar{L}) \tan \beta \tag{B2}$$

A. Inlet.

$$\frac{n_5}{n_1} = \int_{-W/2}^{W/2} \frac{\cos \theta_{15} \cos \theta_{51}}{2l_{15}} dy_1 \tag{B3}$$

Substituting the following geometric relations

$$l_{15}^2 = x_5^2 + (y_5 - y_1)^2$$

$$\cos \theta_{15} = \frac{x_5}{l_{15}}$$

$$\cos \theta_{51} = \cos (\varphi - \theta_{15}) = \frac{x_5}{l_{15}}\left(\frac{x_5 - L}{R}\right) + \frac{y_5}{R}\left(\frac{y_5 - y_1}{l_{15}}\right)$$

into equation (B3) yields

$$\left(\frac{n_5}{n_1}\right)_{in} = \int_{-W_1/2}^{W_1/2} \frac{x_5\left[x_5(x_5 - L) + y_5(y_5 - y_1)\right]}{2R\left[x_5^2 + (y_5 - y_1)^2\right]^{3/2}} \tag{B4}$$

Integrating equation (B4) and nondimensionalizing yields

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2\bar{R}}\left[\frac{(\bar{x}_5 - \bar{L})(1 - 2\bar{y}_5) + 2\bar{x}_5\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 - 2\bar{y}_5)^2}} + \frac{(\bar{x}_5 - \bar{L})(1 + 2\bar{y}_5) - 2\bar{x}_5\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}}\right] \tag{B5}$$

All barred quantities are nondimensional variables made dimensionless by referring them to the inlet width W_1.

B. Wall. The flux at point 5 from one wall is

$$\left(\frac{n_5}{n_1}\right)_w = \int_0^L \frac{n_3(x_3)}{n_1} \frac{\cos\theta_{35} \cos\theta_{53}}{2l_{35}} \sec\beta \, dx_3 \tag{B6}$$

Substituting the following geometric relations

$$\cos\theta_{35} = \frac{y_5 - y_3}{l_{35}} \cos\beta + \frac{x_5 - x_3}{l_{35}} \sin\beta$$

$$\cos\theta_{53} = \frac{y_5 - y_3}{l_{35}} \sin\varphi + \frac{x_5 - x_3}{l_{35}} \cos\varphi$$

$$l_{35}^2 = (x_5 - x_3)^2 + (y_5 - y_3)^2$$

into equation (B6) yields

$$\left(\frac{n_5}{n_1}\right)_w = \int_0^L \frac{n_3(x_3)}{n_1} \frac{\left[y_5 - y_3 + (x_5 - x_3)\tan\beta\right]\left[(y_5 - y_3)\sin\varphi + (x_5 - x_3)\cos\varphi\right]}{2\left[(x_5 - x_3)^2 + (y_5 - y_3)^2\right]^{3/2}} dx_3 \tag{B7}$$

Noting that $y_3 = -(W_1/2) - x_3 \tan\beta$ and nondimensionalizing the resulting equation yields the wall contribution to the flux:

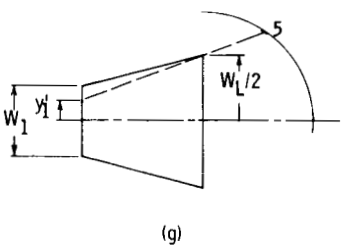
$$\left(\frac{n_5}{n_1}\right)_w = \int_0^{\bar{L}} \frac{n_3(\bar{x}_3)}{n_1} \times \left\{ \frac{(1+2\bar{y}_5+2\bar{x}_5\tan\beta)\left[(1+2\bar{y}_5+2\bar{x}_3\tan\beta)\sin\varphi+2(\bar{x}_5-\bar{x}_3)\cos\varphi\right]}{\left[4(\bar{x}_5-\bar{x}_3)^2+(1+2\bar{y}_5+2\bar{x}_3\tan\beta)^2\right]^{3/2}} \right\} d\bar{x}_3 \qquad \text{(B8)}$$

This is the contribution from one wall only. The contribution from the other wall to the flux at point 5 is obtained by making the substitution $y_5 = -y_5$ into equation (B8).

II. Point 5 is in region II, which is bounded by

$$\frac{\bar{W}_L}{2} + (\bar{x}_5 - \bar{L})\tan\beta \le \bar{y}_5 \le \frac{\bar{W}_L}{2} + \frac{\bar{x}_5 - \bar{L}}{2}\left(\frac{\bar{W}_L + 1}{\bar{L}}\right) \qquad \text{(B9)}$$

A. Inlet. The flux at point 5 from the inlet is similar to equation (B4) with a different upper limit y_1', as may be noted in sketch (g).



(g)

Integration of equation (B4) with the upper limit of y_1' yields

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2R}\left\{ \frac{(x_5 - L)(y_1' - y_5) + x_5y_5}{\sqrt{x_5^2 + (y_1' - y_5)^2}} + \frac{(x_5 - L)[(W_1/2) + y_5] - x_5y_5}{\sqrt{x_5^2 + [(W_1/2) + y_5]^2}} \right\} \qquad \text{(B10)}$$

Expressed in nondimensional form, the contribution from the inlet is

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2\bar{R}}\left[\frac{(\bar{x}_5 - \bar{L})(\bar{y}_1' - \bar{y}_5) + \bar{x}_5\bar{y}_5}{\sqrt{\bar{x}_5^2 + (\bar{y}_1 - \bar{y}_5)^2}} + \frac{(\bar{x}_5 - \bar{L})(1 + 2\bar{y}_5) - 2\bar{x}_5\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}} \right] \qquad \text{(B11)}$$

where

$$\bar{y}_1' = \frac{\bar{W}_L}{2} - \bar{L}\left[\frac{\bar{y}_5 - (\bar{W}_L/2)}{\bar{x}_5 - \bar{L}} \right] \qquad \text{(B12)}$$

B. Wall. The flux at point 5 comes from one wall only and is given by equation (B8).

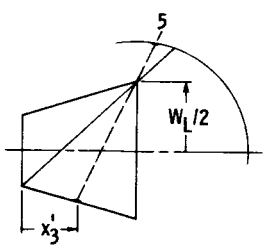
III. Point 5 is in region III, which is bounded by the relation

$$\bar{R} \geq \bar{y}_5 \geq \frac{\bar{W}_L}{2} + \frac{\bar{x}_5 - \bar{L}}{2}\left(\frac{\bar{W}_L + 1}{\bar{L}}\right) \tag{B13}$$

A. Inlet. There is no contribution from the inlet.

B. Wall. The flux from the wall is similar to equation (B8) with a different lower limit $\bar{x}_3'$, as may be noted in sketch (h). Thus, the contribution to the flux at point 5 from the wall is

$$\left(\frac{n_5}{n_1}\right)_w = \int_{\bar{x}_3'}^{\bar{L}} \frac{n_3(\bar{x}_3)}{n_1} \times \left\{\frac{(1+2\bar{y}_5+2\bar{x}_5\tan\beta)\left[(1+2\bar{y}_5+2\bar{x}_3\tan\beta)\sin\varphi+2(\bar{x}_5-\bar{x}_3)\cos\varphi\right]}{\left[4(\bar{x}_5-\bar{x}_3)^2+(1+2\bar{y}_5+2\bar{x}_3\tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \tag{B14}$$



(h)

where

$$\bar{x}_3' = \frac{1}{1+\left[\dfrac{\bar{x}_5-\bar{L}}{\bar{y}_5-(\bar{W}_L/2)}\right]\tan\beta} \times \left\{\bar{L}-\left[\frac{\bar{x}_5-\bar{L}}{\bar{y}_5-(\bar{W}_L/2)}\right]\left[\frac{\bar{W}_L+1}{2}\right]\right\} \tag{B15}$$

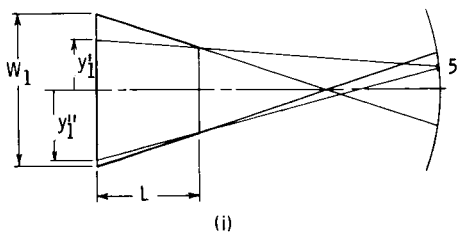
IV. Point 5 is in region IV, which is defined by the conditions

$$\bar{x}_5 \geq \frac{1}{2|\tan\beta|} \tag{B16}$$

and

$$0 \leq \tan\varphi \leq |\tan\beta| - \frac{\bar{W}_L \sec\varphi}{2\bar{R}} \tag{B17}$$

A. Inlet. The flux at point 5 from the inlet will be similar to equation (B4) with different upper and lower limits, as may be noted in sketch (i), where



(i)

$$y_1' = \frac{W_L}{2} - \left[\frac{y_5 - (W_L/2)}{x_5 - L}\right] L$$

$$y_1'' = \left[\frac{y_5 + (W_L/2)}{x_5 - L}\right] L - \frac{W_L}{2}$$

Integration of equation (B4) with lower limit y_1'' and upper limit y_1' yields

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{\bar{W}_L}{4\bar{R}}\left\{\frac{1}{\sqrt{1+\left[(\bar{W}_L/2\bar{R})\sec\varphi - \tan\varphi\right]^2}} + \frac{1}{\sqrt{1+\left[(\bar{W}_L/2\bar{R})\sec\varphi + \tan\varphi\right]^2}}\right\} \qquad (B18)$$

B. Wall. There is no flux from the walls to region IV.

Flux Relations for Planes

I. Refer to figure 1(d). Point 5 is in region I. The bound for region I is given by equation (B2).

A. Inlet. The flux is given directly (ref. 9):

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2}\left[\frac{1 - 2\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 - 2\bar{y}_5)^2}} + \frac{1 + 2\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}}\right] \qquad (B19)$$

B. Wall. The contribution to the flux at point 5 from one wall is

$$\left(\frac{n_5}{n_1}\right)_w = \int_0^L \frac{n_3(\bar{x}_3)}{n_1} \frac{\cos\theta_{35}\cos\theta_{53}}{2l_{35}} \sec\beta \, dx_3 \qquad (B20)$$

Substituting the following geometric relations

$$\cos\theta_{35} = \frac{y_5 - y_3}{l_{35}}\cos\beta + \frac{x_5 - x_3}{l_{35}}\sin\beta$$

$$\cos \theta_{53} = \frac{x_5 - x_3}{l_{35}}$$

$$l_{35}^2 = (x_5 - x_3)^2 + (y_5 - y_3)^2$$

into equation (B20) yields

$$\left(\frac{n_5}{n_1}\right)_w = \frac{1}{2} \int_0^L \frac{n_3(x_3)}{n_1} \frac{(x_5 - x_3)\left[y_5 - y_3 + (x_5 - x_3) \tan \beta\right]}{\left[(x_5 - x_3)^2 + (y_5 - y_3)^2\right]^{3/2}} dx_3 \qquad \text{(B21)}$$

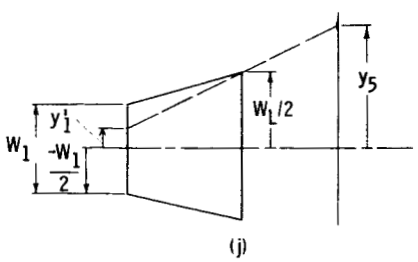
Noting that $y_3 = -\left[(W_1/2) + x_3 \tan \beta\right]$ and nondimensionalizing the resulting equation yields the wall contribution to the flux:

$$\left(\frac{n_5}{n_1}\right)_w = 2 \int_0^{\bar{L}} \frac{n_3(\bar{x}_3)}{n_1} \frac{(\bar{x}_5 - \bar{x}_3)(1 + 2\bar{y}_5 + 2\bar{x}_5 \tan \beta)}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan \beta)^2\right]^{3/2}} d\bar{x}_3 \qquad \text{(B22)}$$

The flux contribution from the other wall is obtained by substituting the relation $\bar{y}_5 = -\bar{y}_5$ into equation (B22).

II. Point 5 is in region II. The bounds for region II are given by the relation (B9).

A. Inlet. The flux at point 5 from the opening is (see sketch (j))



(j)

$$\left(\frac{n_5}{n_1}\right)_{in} = \int_{-W_1/2}^{y_1'} \frac{\cos \theta_{15} \cos \theta_{51}}{2 l_{15}} dy_1 \qquad \text{(B23)}$$

The integration is identical to that employed in obtaining equation (B19) except for the different upper limit. Integration of equation (B23) yields

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2}\left\{\frac{y_1' - y_5}{\sqrt{x_5^2 + (y_1' - y_5)^2}} + \frac{(W_1/2) + y_5}{\sqrt{x^2 + \left[(W_1/2) + y_5\right]^2}}\right\} \qquad \text{(B24)}$$

Putting equation (B24) into nondimensional form, related to W_1, yields

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2}\left[\frac{\bar{y}_1' - \bar{y}_5}{\sqrt{\bar{x}_5^2 + (\bar{y}_1' - \bar{y}_5)^2}} + \frac{1 + 2\bar{y}_5}{\sqrt{4\bar{x}_5^2 + (1 + 2\bar{y}_5)^2}}\right] \tag{B25}$$

where

$$\bar{y}_1' = \frac{\bar{W}_L}{2} - \bar{L}\left[\frac{\bar{y}_5 - (\bar{W}_L/2)}{\bar{x}_5 - \bar{L}}\right] \tag{B26}$$

B. Wall. Only one wall contributes flux to point 5 in region II. The flux is given by equation (B22).

III. Point 5 is in region III. The bound for region III is

$$\bar{y}_5 \geq \frac{\bar{W}_L}{2} + \frac{\bar{x}_5 - \bar{L}}{2}\left(\frac{\bar{W}_L + 1}{\bar{L}}\right) \tag{B27}$$

A. Inlet. There is no contribution to flux from the inlet.

B. Wall. The wall contribution to the flux is similar to equation (B22) with a different lower limit $\bar{x}_3'$, similar to the situation illustrated in sketch (f). The relation is

$$\left(\frac{n_5}{n_1}\right)_w = 2\int_{\bar{x}_3'}^{\bar{L}} \frac{n_3(\bar{x}_3)}{n_1}(\bar{x}_5 - \bar{x}_3) \times \left\{\frac{1 + 2\bar{y}_5 + 2\bar{x}_5 \tan\beta}{\left[4(\bar{x}_5 - \bar{x}_3)^2 + (1 + 2\bar{y}_5 + 2\bar{x}_3 \tan\beta)^2\right]^{3/2}}\right\} d\bar{x}_3 \tag{B28}$$

where $\bar{x}_3'$ is given by equation (B15).

IV. Point 5 is in region IV. The bounds for region IV are given by the relation (B16) and

$$0 \leq \bar{y}_5 \leq \bar{x}_5|\tan\beta| - \frac{1}{2} \tag{B29}$$

A. Inlet. The flux at point 5 from the inlet (see sketch (i)) is

$$\left(\frac{n_5}{n_1}\right)_{in} = \int_{-y_1''}^{y_1'} \frac{\cos\theta_{15}\cos\theta_{51}}{2l_{15}}\,dy_1 \tag{B30}$$

Integration of equation (B30) is identical to that for obtaining equation (B24) except for the different limits. Integration of equation (B30) yields

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2}\left[\frac{y_1' - y_5}{\sqrt{x_5^2 + (y_1' - y_5)^2}} + \frac{y_1'' + y_5}{\sqrt{x_5^2 + (y_1'' + y_5)^2}}\right] \tag{B31}$$

The geometric relations

$$\frac{y_5 - L}{(W_L/2) - y_5} = \frac{x_5}{y_1' - y_5} \tag{B32}$$

$$\frac{x_5 - L}{(W_L/2) + y_5} = \frac{x_5}{y_1'' + y_5} \tag{B33}$$

can be used to rewrite equation (B31) in nondimensional form:

$$\left(\frac{n_5}{n_1}\right)_{in} = \frac{1}{2}\left[\frac{\bar{W}_L - 2\bar{y}_5}{\sqrt{4(\bar{x}_5 - \bar{L})^2 + (\bar{W}_L - 2\bar{y}_5)^2}} + \frac{\bar{W}_L + 2\bar{y}_5}{\sqrt{4(\bar{x}_5 - \bar{L})^2 + (\bar{W}_L + 2\bar{y}_5)^2}}\right] \tag{B34}$$

Comparison of equations (B34) and (B19) indicates that equation (B34) is identical in form to the expression for flux that would arrive at point 5 from the exit alone as the source having the same emission rate as the inlet.

B. Wall. There is no wall contribution to the flux at point 5 in region IV.

REFERENCES

1. Childs, J. Howard: Theoretical Performance of Reverse-Feed Cesium Ion Engines. NASA TN D-876, 1961.

2. Mickelsen, William R., and Kaufman, Harold R.: Status of Electrostatic Thrustors for Space Propulsion. NASA TN D-2172, 1964.

3. Brewer, G. R.: On the Nature of Leakage Currents in Cesium Contact Ion Engines. Res. Rep. 281, Hughes Res. Labs., Aug. 1963.

4. Richley, Edward A., and Mickelsen, William R.: Effects of Molecular Flow in Plasma Generation and Some Analyses of Space Charge Flow in Ion Acceleration. Paper 64-7, AIAA, 1964.

5. Goldin, D. S., and Norgren, C. T.: Thrust Measurements of Colloidal Particles as an Indication of Particle Size and Thrustor Operation. Paper 63050-63, AIAA, 1963.

6. Clausing, P.: The Formation of Beams in Molecular Streaming. Zs. Physik, vol. 66, 1930, pp. 471-476.

7. Dayton, B. B.: Gas Flow Patterns of Entrances and Exits of Cylindrical Tubes. Consolidated Electrodynamics Corp., Sept. 13, 1956.

8. Cook, Harlan, and Richley, Edward A.: Measurements of Efflux Patterns and Flow Rates from Cylindrical Tubes in Free-Molecule and Slip Flows. NASA TN D-2480, 1964.

9. Jakob, Max: Heat Transfer. Vol. II. John Wiley & Sons., Inc., 1957.

10. Richley, Edward A., and Reynolds, Thaine W.: Numerical Solutions of Free-Molecule Flow in Converging and Diverging Tubes and Slots. NASA TN D-2330, 1964.

TABLE I. - CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(a) Length to inlet width ratio, 0.25

(a-1) Wall half-angle, 0°

Axial distance from slot exit, $\frac{}{x} - \frac{}{L}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - \frac{}{L}}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.80071	0.999	0.997	0.993	0.988	0.981	0.972	0.948	0.915	0.860	0.785	0.691	0.582	0.311	0.155	0.046	0.007	0.003
0.50	0.63040	0.996	0.986	0.968	0.944	0.912	0.874	0.781	0.672	0.500	0.354	0.245	0.170	0.086	0.047	0.016	0.004	0.001
1.00	0.40904	0.992	0.967	0.927	0.875	0.814	0.734	0.574	0.431	0.295	0.201	0.138	0.097	0.051	0.028	0.010	0.003	0.001
2.00	0.22968	0.988	0.953	0.894	0.815	0.729	0.642	0.482	0.353	0.237	0.161	0.111	0.078	0.041	0.023	0.008	0.002	0.001
4.00	0.12043	0.986	0.938	0.867	0.784	0.695	0.607	0.450	0.327	0.218	0.148	0.102	0.072	0.038	0.021	0.008	0.002	0.001
8.00	0.06144	0.981	0.928	0.856	0.771	0.681	0.594	0.438	0.317	0.211	0.143	0.098	0.069	0.036	0.020	0.007	0.002	0.001
16.00	0.03099	0.977	0.924	0.850	0.765	0.676	0.588	0.433	0.313	0.208	0.141	0.097	0.068	0.036	0.020	0.007	0.002	0.001
32.00	0.01556	0.975	0.921	0.848	0.763	0.673	0.586	0.431	0.311	0.207	0.140	0.096	0.068	0.035	0.020	0.007	0.002	0.001
64.00	0.00780	0.974	0.920	0.847	0.762	0.672	0.584	0.430	0.310	0.206	0.139	0.096	0.067	0.035	0.020	0.007	0.002	0.001
128.00	0.00390	0.973	0.920	0.846	0.761	0.671	0.584	0.429	0.310	0.206	0.139	0.096	0.067	0.035	0.020	0.007	0.002	0.001
256.00	0.00195	0.973	0.920	0.846	0.761	0.671	0.584	0.429	0.310	0.206	0.139	0.095	0.067	0.035	0.020	0.007	0.002	0.001
512.00	0.00098	0.973	0.919	0.846	0.761	0.671	0.583	0.429	0.309	0.206	0.139	0.095	0.067	0.035	0.020	0.007	0.002	0.001

(a-2) Wall half-angle, 5°

0.25	0.79551	0.999	0.997	0.993	0.988	0.981	0.973	0.950	0.919	0.867	0.798	0.710	0.606	0.349	0.173	0.050	0.007	0.003
0.50	0.62980	0.997	0.987	0.970	0.946	0.917	0.880	0.791	0.685	0.528	0.375	0.260	0.180	0.090	0.049	0.017	0.003	0.001
1.00	0.41202	0.992	0.968	0.929	0.878	0.818	0.752	0.590	0.444	0.303	0.206	0.142	0.099	0.051	0.029	0.010	0.003	0.001
2.00	0.23264	0.988	0.954	0.901	0.827	0.740	0.652	0.489	0.358	0.240	0.163	0.112	0.079	0.041	0.023	0.008	0.002	0.001
4.00	0.12232	0.986	0.948	0.877	0.792	0.702	0.613	0.454	0.329	0.220	0.148	0.102	0.072	0.037	0.021	0.007	0.002	0.001
8.00	0.06248	0.986	0.938	0.864	0.778	0.687	0.598	0.441	0.319	0.212	0.143	0.098	0.069	0.036	0.020	0.007	0.002	0.001
16.00	0.03154	0.985	0.933	0.858	0.772	0.681	0.592	0.435	0.314	0.209	0.140	0.096	0.068	0.035	0.020	0.007	0.002	0.001
32.00	0.01584	0.985	0.930	0.855	0.769	0.678	0.589	0.433	0.312	0.207	0.139	0.096	0.067	0.035	0.019	0.007	0.002	0.001
64.00	0.00794	0.984	0.929	0.854	0.767	0.677	0.588	0.431	0.311	0.206	0.139	0.095	0.067	0.035	0.019	0.007	0.002	0.001
128.00	0.00397	0.983	0.928	0.853	0.767	0.676	0.587	0.431	0.310	0.206	0.138	0.095	0.067	0.035	0.019	0.007	0.002	0.001
256.00	0.00199	0.983	0.928	0.853	0.766	0.676	0.587	0.431	0.310	0.206	0.138	0.095	0.067	0.035	0.019	0.007	0.002	0.001
512.00	0.00099	0.983	0.928	0.853	0.766	0.675	0.587	0.430	0.310	0.206	0.138	0.095	0.066	0.035	0.019	0.007	0.002	0.001

(a-3) Wall half-angle, 10°

0.25	0.78814	0.999	0.997	0.993	0.988	0.982	0.973	0.951	0.922	0.873	0.809	0.728	0.631	0.403	0.201	0.056	0.008	0.002
0.50	0.62721	0.997	0.987	0.971	0.949	0.921	0.886	0.801	0.698	0.562	0.405	0.282	0.195	0.097	0.051	0.017	0.003	0.001
1.00	0.41395	0.992	0.969	0.931	0.882	0.823	0.758	0.612	0.462	0.316	0.214	0.147	0.103	0.053	0.029	0.010	0.002	0.001
2.00	0.23523	0.988	0.955	0.902	0.836	0.756	0.666	0.500	0.366	0.245	0.165	0.113	0.079	0.041	0.023	0.008	0.002	0.001
4.00	0.12408	0.987	0.948	0.889	0.805	0.714	0.623	0.461	0.334	0.222	0.149	0.102	0.072	0.037	0.020	0.007	0.002	0.001
8.00	0.06348	0.986	0.945	0.876	0.789	0.696	0.606	0.445	0.321	0.213	0.143	0.098	0.068	0.035	0.019	0.007	0.002	0.001
16.00	0.03207	0.985	0.944	0.870	0.781	0.689	0.599	0.439	0.316	0.209	0.140	0.096	0.067	0.035	0.019	0.007	0.002	0.001
32.00	0.01611	0.985	0.943	0.867	0.778	0.686	0.595	0.436	0.314	0.208	0.139	0.095	0.066	0.034	0.019	0.006	0.002	0.001
64.00	0.00808	0.985	0.942	0.865	0.776	0.684	0.594	0.435	0.313	0.207	0.139	0.095	0.066	0.034	0.019	0.006	0.002	0.001
128.00	0.00404	0.985	0.941	0.864	0.776	0.683	0.593	0.434	0.312	0.206	0.138	0.095	0.066	0.034	0.019	0.006	0.002	0.001
256.00	0.00202	0.985	0.940	0.864	0.775	0.683	0.593	0.434	0.312	0.206	0.138	0.094	0.066	0.034	0.019	0.006	0.002	0.001
512.00	0.00101	0.985	0.940	0.864	0.775	0.683	0.592	0.434	0.312	0.206	0.138	0.094	0.066	0.034	0.019	0.006	0.002	0.001

(a-4) Wall half-angle, 20°

0.25	0.77413	0.999	0.997	0.993	0.988	0.982	0.973	0.952	0.924	0.877	0.818	0.746	0.660	0.467	0.263	0.069	0.008	0.002
0.50	0.61924	0.997	0.988	0.973	0.952	0.926	0.893	0.813	0.717	0.586	0.460	0.326	0.225	0.110	0.058	0.018	0.003	0.001
1.00	0.41360	0.992	0.970	0.935	0.887	0.831	0.768	0.634	0.500	0.342	0.232	0.158	0.110	0.056	0.030	0.010	0.002	0.001
2.00	0.23733	0.989	0.956	0.904	0.840	0.766	0.690	0.525	0.384	0.256	0.172	0.118	0.082	0.042	0.023	0.007	0.002	0.001
4.00	0.12584	0.987	0.949	0.890	0.817	0.738	0.645	0.476	0.344	0.228	0.153	0.104	0.072	0.037	0.020	0.006	0.002	0.001
8.00	0.06454	0.986	0.945	0.884	0.808	0.717	0.623	0.457	0.329	0.217	0.145	0.099	0.069	0.035	0.019	0.006	0.002	0.001
16.00	0.03265	0.986	0.944	0.881	0.804	0.708	0.614	0.449	0.322	0.213	0.142	0.097	0.067	0.034	0.018	0.006	0.001	0.001
32.00	0.01641	0.985	0.943	0.880	0.799	0.703	0.610	0.445	0.319	0.210	0.140	0.095	0.066	0.034	0.018	0.006	0.001	0.001
64.00	0.00823	0.985	0.943	0.879	0.797	0.701	0.608	0.444	0.318	0.209	0.140	0.095	0.066	0.034	0.018	0.006	0.001	0.001
128.00	0.00412	0.985	0.943	0.879	0.796	0.700	0.607	0.443	0.317	0.209	0.139	0.095	0.066	0.033	0.018	0.006	0.001	0.001
256.00	0.00206	0.985	0.943	0.879	0.796	0.700	0.606	0.442	0.317	0.209	0.139	0.095	0.066	0.033	0.018	0.006	0.001	0.001
512.00	0.00103	0.985	0.943	0.879	0.795	0.699	0.606	0.442	0.317	0.208	0.139	0.094	0.066	0.033	0.018	0.006	0.001	0.001

(a-5) Wall half-angle, 30°

0.25	0.75842	0.999	0.997	0.993	0.988	0.981	0.972	0.951	0.922	0.876	0.819	0.752	0.674	0.498	0.334	0.092	0.010	0.002
0.50	0.60752	0.997	0.988	0.974	0.954	0.928	0.898	0.822	0.730	0.604	0.481	0.373	0.271	0.131	0.067	0.021	0.002	0.001
1.00	0.40933	0.993	0.971	0.937	0.892	0.837	0.776	0.645	0.518	0.381	0.258	0.175	0.121	0.061	0.032	0.010	0.002	0.001
2.00	0.23693	0.989	0.957	0.906	0.843	0.770	0.695	0.547	0.411	0.274	0.183	0.125	0.086	0.044	0.023	0.007	0.001	0.001
4.00	0.12627	0.987	0.949	0.891	0.819	0.740	0.659	0.501	0.361	0.239	0.159	0.108	0.075	0.038	0.020	0.006	0.001	0.001
8.00	0.06493	0.986	0.946	0.884	0.809	0.727	0.643	0.477	0.342	0.225	0.150	0.102	0.070	0.035	0.019	0.006	0.001	0.000
16.00	0.03288	0.986	0.944	0.881	0.804	0.721	0.637	0.466	0.334	0.219	0.146	0.099	0.068	0.034	0.018	0.006	0.001	0.000
32.00	0.01654	0.985	0.944	0.880	0.802	0.718	0.633	0.462	0.330	0.217	0.144	0.097	0.067	0.034	0.018	0.005	0.001	0.000
64.00	0.00829	0.985	0.943	0.879	0.801	0.717	0.631	0.459	0.328	0.215	0.143	0.097	0.067	0.034	0.018	0.005	0.001	0.000
128.00	0.00415	0.985	0.943	0.879	0.801	0.716	0.630	0.458	0.327	0.215	0.142	0.096	0.067	0.033	0.018	0.005	0.001	0.000
256.00	0.00208	0.985	0.943	0.879	0.801	0.716	0.629	0.458	0.327	0.214	0.142	0.096	0.066	0.033	0.018	0.005	0.001	0.000
512.00	0.00104	0.985	0.943	0.879	0.801	0.716	0.629	0.457	0.327	0.214	0.142	0.096	0.066	0.033	0.018	0.005	0.001	0.000

(a-6) Wall half-angle, 45°

0.25	0.73732	0.999	0.997	0.993	0.987	0.979	0.970	0.947	0.917	0.869	0.811	0.744	0.670	0.514	0.365	0.167	0.017	0.001
0.50	0.58853	0.997	0.988	0.974	0.954	0.929	0.899	0.825	0.738	0.619	0.500	0.394	0.306	0.185	0.093	0.028	0.003	0.001
1.00	0.39880	0.993	0.973	0.940	0.896	0.843	0.784	0.656	0.532	0.397	0.294	0.218	0.149	0.074	0.039	0.012	0.001	0.000
2.00	0.23294	0.989	0.958	0.909	0.846	0.775	0.701	0.555	0.428	0.306	0.212	0.144	0.099	0.049	0.026	0.008	0.001	0.000
4.00	0.12490	0.987	0.950	0.892	0.821	0.742	0.662	0.511	0.386	0.267	0.178	0.120	0.083	0.041	0.022	0.007	0.001	0.000
8.00	0.06442	0.986	0.946	0.885	0.810	0.728	0.645	0.492	0.369	0.247	0.164	0.111	0.076	0.038	0.020	0.006	0.001	0.000
16.00	0.03268	0.986	0.944	0.882	0.805	0.721	0.637	0.484	0.361	0.239	0.158	0.107	0.073	0.037	0.019	0.006	0.001	0.000
32.00	0.01645	0.985	0.944	0.880	0.803	0.718	0.634	0.480	0.357	0.235	0.156	0.105	0.072	0.036	0.019	0.006	0.001	0.000
64.00	0.00825	0.985	0.943	0.879	0.802	0.717	0.632	0.478	0.355	0.233	0.154	0.104	0.072	0.036	0.019	0.005	0.001	0.000
128.00	0.00413	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.232	0.154	0.104	0.071	0.035	0.019	0.005	0.001	0.000
256.00	0.00207	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.232	0.153	0.103	0.071	0.035	0.019	0.005	0.001	0.000
512.00	0.00103	0.985	0.943	0.879	0.801	0.716	0.631	0.476	0.354	0.231	0.153	0.103	0.071	0.035	0.019	0.005	0.001	0.000

(a-7) Wall half-angle, 60°

0.25	0.72103	0.999	0.996	0.992	0.986	0.978	0.968	0.943	0.911	0.860	0.799	0.729	0.654	0.502	0.368	0.182	0.038	0.005
0.50	0.57153	0.997	0.988	0.973	0.953	0.927	0.896	0.821	0.734	0.618	0.505	0.403	0.317	0.194	0.123	0.046	0.006	0.000
1.00	0.38675	0.993	0.973	0.940	0.897	0.845	0.787	0.662	0.539	0.406	0.301	0.224	0.164	0.100	0.055	0.017	0.002	0.000
2.00	0.22689	0.989	0.958	0.910	0.849	0.779	0.705	0.560	0.433	0.311	0.224	0.163	0.121	0.064	0.034	0.011	0.001	0.000
4.00	0.12215	0.987	0.950	0.893	0.823	0.744	0.664	0.514	0.389	0.273	0.194	0.140	0.102	0.051	0.027	0.008	0.000	0.000
8.00	0.06316	0.986	0.946	0.886	0.811	0.729	0.646	0.494	0.370	0.258	0.182	0.131	0.092	0.046	0.025	0.008	0.000	0.000
16.00	0.03208	0.986	0.945	0.882	0.805	0.722	0.638	0.484	0.361	0.250	0.176	0.126	0.087	0.044	0.023	0.007	0.000	0.000
32.00	0.01616	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.357	0.247	0.173	0.124	0.085	0.043	0.023	0.007	0.000	0.000
64.00	0.00811	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.355	0.245	0.172	0.122	0.084	0.042	0.023	0.007	0.000	0.000
128.00	0.00406	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.355	0.245	0.171	0.121	0.084	0.042	0.022	0.007	0.000	0.000
256.00	0.00203	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.244	0.171	0.121	0.084	0.042	0.022	0.007	0.000	0.000
512.00	0.00102	0.985	0.943	0.879	0.801	0.716	0.631	0.476	0.354	0.244	0.171	0.121	0.083	0.042	0.022	0.007	0.000	0.000

(a-8) Wall half-angle, 75°

0.25	0.71038	0.999	0.996	0.992	0.985	0.977	0.967	0.940	0.906	0.853	0.789	0.716	0.638	0.482	0.349	0.179	0.056	0.023
0.50	0.55896	0.997	0.987	0.972	0.951	0.924	0.892	0.815	0.725	0.608	0.495	0.396	0.314	0.197	0.127	0.058	0.018	0.004
1.00	0.37586	0.993	0.972	0.939	0.895	0.843	0.785	0.660	0.539	0.407	0.304	0.227	0.172	0.102	0.064	0.029	0.007	0.001
2.00	0.22032	0.989	0.959	0.911	0.849	0.780	0.706	0.562	0.436	0.313	0.226	0.165	0.123	0.072	0.045	0.020	0.004	0.000
4.00	0.11883	0.987	0.950	0.894	0.824	0.746	0.666	0.515	0.391	0.275	0.195	0.141	0.104	0.060	0.037	0.017	0.003	0.000
8.00	0.06153	0.986	0.946	0.886	0.811	0.730	0.647	0.495	0.371	0.258	0.182	0.131	0.096	0.056	0.034	0.015	0.002	0.000
16.00	0.03128	0.986	0.945	0.882	0.806	0.722	0.638	0.485	0.362	0.251	0.176	0.126	0.093	0.053	0.033	0.014	0.002	0.000
32.00	0.01576	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.358	0.247	0.173	0.124	0.091	0.052	0.032	0.014	0.002	0.000
64.00	0.00791	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.356	0.246	0.172	0.123	0.090	0.052	0.032	0.013	0.002	0.000
128.00	0.00396	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.355	0.245	0.171	0.123	0.090	0.051	0.032	0.013	0.002	0.000
256.00	0.00198	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.244	0.171	0.122	0.090	0.051	0.032	0.013	0.002	0.000
512.00	0.00099	0.985	0.943	0.879	0.801	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.090	0.051	0.032	0.013	0.002	0.000

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(b) Length to inlet width ratio, 0.50

(b-1) Wall half-angle, 0°

Axial distance from slot exit, $\frac{x}{x - L}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.72204	0.999	0.997	0.994	0.988	0.982	0.973	0.951	0.921	0.870	0.801	0.714	0.614	0.317	0.148	0.033	0.007	0.003
0.50	0.57375	0.997	0.987	0.971	0.948	0.920	0.885	0.799	0.698	0.513	0.355	0.239	0.160	0.073	0.034	0.013	0.004	0.001
1.00	0.38014	0.992	0.970	0.933	0.885	0.829	0.744	0.573	0.424	0.281	0.184	0.121	0.080	0.036	0.021	0.009	0.003	0.001
2.00	0.21896	0.989	0.957	0.895	0.809	0.718	0.626	0.460	0.329	0.212	0.137	0.090	0.059	0.029	0.017	0.007	0.002	0.001
4.00	0.11717	0.987	0.932	0.852	0.762	0.668	0.577	0.416	0.293	0.187	0.120	0.078	0.051	0.026	0.016	0.007	0.002	0.001
8.00	0.06054	0.977	0.914	0.832	0.740	0.646	0.555	0.397	0.278	0.177	0.113	0.073	0.048	0.025	0.015	0.007	0.002	0.001
16.00	0.03076	0.969	0.905	0.822	0.730	0.636	0.545	0.389	0.272	0.172	0.110	0.071	0.046	0.025	0.015	0.006	0.002	0.001
32.00	0.01550	0.965	0.900	0.817	0.725	0.631	0.541	0.385	0.268	0.170	0.108	0.070	0.045	0.025	0.015	0.006	0.002	0.001
64.00	0.00778	0.963	0.898	0.815	0.723	0.628	0.538	0.383	0.267	0.169	0.107	0.069	0.045	0.025	0.015	0.006	0.002	0.001
128.00	0.00390	0.962	0.897	0.814	0.722	0.627	0.537	0.382	0.266	0.168	0.107	0.069	0.045	0.025	0.015	0.006	0.002	0.001
256.00	0.00195	0.961	0.896	0.813	0.721	0.627	0.536	0.381	0.266	0.168	0.107	0.069	0.045	0.024	0.015	0.006	0.002	0.001
512.00	0.00098	0.961	0.896	0.813	0.721	0.626	0.536	0.381	0.265	0.168	0.107	0.069	0.045	0.024	0.015	0.006	0.002	0.001

(b-2) Wall half-angle, 5°

0.25	0.71156	0.999	0.997	0.994	0.989	0.983	0.976	0.957	0.930	0.887	0.828	0.754	0.663	0.406	0.191	0.041	0.007	0.003
0.50	0.57276	0.997	0.988	0.974	0.954	0.928	0.896	0.818	0.723	0.574	0.404	0.273	0.183	0.082	0.037	0.013	0.003	0.001
1.00	0.38582	0.993	0.971	0.937	0.891	0.837	0.776	0.607	0.451	0.300	0.196	0.129	0.085	0.037	0.020	0.008	0.002	0.001
2.00	0.22460	0.989	0.958	0.909	0.834	0.741	0.647	0.476	0.340	0.219	0.141	0.092	0.060	0.028	0.016	0.007	0.002	0.001
4.00	0.12081	0.987	0.950	0.873	0.780	0.684	0.590	0.425	0.299	0.190	0.122	0.078	0.051	0.025	0.015	0.006	0.002	0.001
8.00	0.06257	0.986	0.933	0.849	0.755	0.658	0.565	0.404	0.282	0.178	0.113	0.073	0.047	0.024	0.014	0.006	0.002	0.001
16.00	0.03183	0.986	0.923	0.838	0.743	0.647	0.554	0.394	0.274	0.173	0.110	0.070	0.045	0.023	0.014	0.006	0.002	0.001
32.00	0.01605	0.985	0.918	0.833	0.738	0.641	0.549	0.389	0.271	0.170	0.108	0.069	0.045	0.023	0.014	0.006	0.002	0.001
64.00	0.00806	0.982	0.915	0.830	0.735	0.638	0.546	0.387	0.269	0.169	0.107	0.068	0.044	0.023	0.014	0.006	0.002	0.001
128.00	0.00404	0.981	0.914	0.829	0.734	0.637	0.545	0.386	0.268	0.168	0.107	0.068	0.044	0.023	0.014	0.006	0.002	0.001
256.00	0.00202	0.981	0.913	0.828	0.733	0.636	0.544	0.385	0.267	0.168	0.106	0.068	0.044	0.023	0.014	0.006	0.002	0.001
512.00	0.00101	0.980	0.913	0.828	0.733	0.636	0.544	0.385	0.267	0.168	0.106	0.068	0.044	0.023	0.014	0.006	0.002	0.001

(b-3) Wall half-angle, 10°

0.25	0.69649	0.999	0.998	0.995	0.990	0.985	0.978	0.960	0.937	0.899	0.850	0.787	0.710	0.528	0.265	0.056	0.007	0.003
0.50	0.56722	0.997	0.990	0.977	0.959	0.936	0.908	0.837	0.750	0.628	0.474	0.324	0.217	0.097	0.043	0.013	0.003	0.001
1.00	0.38888	0.993	0.973	0.941	0.898	0.846	0.788	0.656	0.491	0.328	0.214	0.140	0.092	0.040	0.020	0.008	0.002	0.001
2.00	0.22920	0.989	0.959	0.911	0.850	0.775	0.678	0.500	0.357	0.230	0.147	0.095	0.061	0.026	0.015	0.006	0.002	0.001
4.00	0.12405	0.987	0.951	0.895	0.807	0.707	0.610	0.439	0.308	0.195	0.124	0.079	0.051	0.023	0.014	0.006	0.002	0.001
8.00	0.06444	0.986	0.947	0.875	0.777	0.677	0.581	0.414	0.288	0.181	0.115	0.073	0.047	0.022	0.013	0.006	0.002	0.001
16.00	0.03282	0.986	0.945	0.861	0.763	0.663	0.567	0.402	0.279	0.175	0.110	0.070	0.045	0.022	0.013	0.005	0.002	0.001
32.00	0.01656	0.985	0.943	0.855	0.757	0.656	0.561	0.397	0.275	0.172	0.108	0.069	0.044	0.021	0.013	0.005	0.002	0.001
64.00	0.00832	0.985	0.940	0.852	0.753	0.653	0.558	0.394	0.273	0.171	0.107	0.068	0.043	0.021	0.013	0.005	0.002	0.001
128.00	0.00417	0.985	0.939	0.850	0.752	0.652	0.556	0.393	0.272	0.170	0.107	0.068	0.043	0.021	0.013	0.005	0.002	0.001
256.00	0.00209	0.985	0.938	0.849	0.751	0.651	0.555	0.392	0.271	0.169	0.106	0.067	0.043	0.021	0.013	0.005	0.002	0.001
512.00	0.00104	0.985	0.938	0.849	0.750	0.650	0.555	0.392	0.271	0.169	0.106	0.067	0.043	0.021	0.013	0.005	0.002	0.001

(b-4) Wall half-angle, 20°

0.25	0.66834	0.999	0.998	0.995	0.991	0.985	0.979	0.962	0.941	0.907	0.866	0.816	0.756	0.608	0.443	0.101	0.008	0.002
0.50	0.55060	0.998	0.991	0.980	0.964	0.945	0.920	0.860	0.784	0.674	0.559	0.443	0.300	0.133	0.059	0.013	0.003	0.001
1.00	0.38639	0.994	0.976	0.947	0.908	0.860	0.806	0.687	0.568	0.391	0.256	0.167	0.109	0.046	0.019	0.007	0.002	0.001
2.00	0.23210	0.990	0.961	0.915	0.857	0.789	0.718	0.553	0.396	0.254	0.162	0.104	0.067	0.027	0.013	0.006	0.002	0.001
4.00	0.12689	0.988	0.952	0.897	0.828	0.752	0.656	0.472	0.331	0.209	0.131	0.083	0.053	0.021	0.012	0.005	0.001	0.001
8.00	0.06624	0.986	0.947	0.888	0.814	0.720	0.617	0.438	0.304	0.190	0.119	0.075	0.047	0.019	0.011	0.005	0.001	0.001
16.00	0.03382	0.986	0.945	0.883	0.807	0.701	0.599	0.423	0.292	0.182	0.113	0.071	0.045	0.019	0.011	0.005	0.001	0.001
32.00	0.01709	0.985	0.944	0.881	0.799	0.692	0.590	0.416	0.286	0.178	0.111	0.069	0.044	0.018	0.011	0.005	0.001	0.001
64.00	0.00859	0.985	0.943	0.880	0.794	0.688	0.586	0.412	0.284	0.176	0.110	0.069	0.043	0.018	0.011	0.005	0.001	0.001
128.00	0.00430	0.985	0.943	0.879	0.792	0.686	0.584	0.411	0.282	0.175	0.109	0.068	0.043	0.018	0.011	0.005	0.001	0.001
256.00	0.00216	0.985	0.943	0.879	0.791	0.684	0.583	0.410	0.282	0.175	0.109	0.068	0.043	0.018	0.011	0.005	0.001	0.001
512.00	0.00108	0.985	0.943	0.879	0.791	0.684	0.582	0.409	0.281	0.174	0.108	0.068	0.042	0.018	0.011	0.005	0.001	0.001

(b-5) Wall half angle, 30°

0.25	0.63830	0.999	0.998	0.994	0.990	0.985	0.978	0.961	0.940	0.906	0.867	0.821	0.769	0.650	0.511	0.213	0.008	0.002
0.50	0.52778	0.998	0.992	0.981	0.967	0.949	0.927	0.872	0.804	0.706	0.600	0.495	0.401	0.202	0.089	0.015	0.003	0.001
1.00	0.37641	0.994	0.978	0.951	0.916	0.872	0.821	0.709	0.592	0.460	0.326	0.212	0.138	0.059	0.024	0.006	0.002	0.001
2.00	0.22998	0.990	0.963	0.919	0.863	0.798	0.728	0.589	0.459	0.295	0.188	0.120	0.077	0.031	0.011	0.005	0.001	0.001
4.00	0.12700	0.988	0.953	0.899	0.831	0.756	0.678	0.525	0.368	0.232	0.146	0.092	0.058	0.022	0.010	0.004	0.001	0.000
8.00	0.06663	0.987	0.948	0.889	0.816	0.736	0.654	0.479	0.331	0.207	0.129	0.081	0.050	0.019	0.009	0.004	0.001	0.000
16.00	0.03410	0.986	0.945	0.884	0.808	0.725	0.642	0.458	0.315	0.196	0.121	0.076	0.047	0.017	0.009	0.004	0.001	0.000
32.00	0.01725	0.986	0.944	0.881	0.804	0.720	0.636	0.448	0.308	0.190	0.118	0.073	0.046	0.017	0.009	0.004	0.001	0.000
64.00	0.00867	0.985	0.943	0.880	0.802	0.718	0.632	0.443	0.304	0.188	0.116	0.072	0.045	0.016	0.009	0.004	0.001	0.000
128.00	0.00435	0.985	0.943	0.879	0.801	0.717	0.629	0.441	0.302	0.187	0.115	0.072	0.044	0.016	0.009	0.004	0.001	0.000
256.00	0.00218	0.985	0.943	0.879	0.801	0.716	0.627	0.440	0.301	0.186	0.115	0.071	0.044	0.016	0.009	0.004	0.001	0.000
512.00	0.00109	0.985	0.943	0.879	0.801	0.716	0.627	0.439	0.301	0.186	0.115	0.071	0.044	0.016	0.009	0.004	0.001	0.000

(b-6) Wall half-angle, 45°

0.25	0.60090	0.999	0.997	0.994	0.989	0.983	0.976	0.957	0.934	0.898	0.856	0.809	0.758	0.649	0.539	0.330	0.040	0.002
0.50	0.49453	0.998	0.992	0.981	0.967	0.949	0.927	0.874	0.811	0.723	0.628	0.534	0.444	0.297	0.199	0.041	0.002	0.001
1.00	0.35582	0.995	0.980	0.955	0.922	0.881	0.834	0.729	0.619	0.488	0.378	0.291	0.225	0.098	0.042	0.005	0.001	0.000
2.00	0.22112	0.991	0.965	0.923	0.870	0.807	0.740	0.604	0.479	0.353	0.260	0.167	0.108	0.045	0.018	0.003	0.001	0.000
4.00	0.12360	0.988	0.954	0.902	0.836	0.762	0.685	0.538	0.413	0.294	0.186	0.118	0.075	0.030	0.011	0.003	0.001	0.000
8.00	0.06526	0.987	0.949	0.890	0.818	0.738	0.657	0.506	0.382	0.253	0.159	0.100	0.063	0.025	0.008	0.003	0.001	0.000
16.00	0.03351	0.986	0.946	0.884	0.809	0.727	0.644	0.491	0.368	0.235	0.147	0.092	0.058	0.022	0.007	0.002	0.001	0.000
32.00	0.01698	0.986	0.944	0.882	0.805	0.721	0.637	0.483	0.361	0.227	0.141	0.088	0.055	0.021	0.006	0.002	0.001	0.000
64.00	0.00855	0.985	0.944	0.880	0.803	0.718	0.634	0.480	0.357	0.223	0.138	0.086	0.054	0.020	0.006	0.002	0.001	0.000
128.00	0.00429	0.985	0.943	0.879	0.801	0.717	0.632	0.478	0.355	0.221	0.137	0.086	0.054	0.020	0.006	0.002	0.001	0.000
256.00	0.00215	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.220	0.136	0.085	0.053	0.020	0.006	0.002	0.001	0.000
512.00	0.00107	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.219	0.136	0.085	0.053	0.020	0.006	0.002	0.001	0.000

(b-7) Wall half-angle, 60°

0.25	0.57469	0.999	0.997	0.993	0.988	0.982	0.974	0.953	0.928	0.889	0.844	0.794	0.739	0.627	0.517	0.338	0.128	0.023
0.50	0.46856	0.998	0.991	0.980	0.965	0.946	0.923	0.868	0.803	0.714	0.623	0.535	0.454	0.318	0.218	0.107	0.006	0.000
1.00	0.33584	0.995	0.980	0.955	0.922	0.882	0.837	0.735	0.629	0.503	0.394	0.306	0.238	0.147	0.095	0.022	0.001	0.000
2.00	0.21001	0.991	0.966	0.926	0.874	0.813	0.747	0.614	0.490	0.364	0.269	0.200	0.151	0.084	0.038	0.006	0.000	0.000
4.00	0.11832	0.988	0.955	0.904	0.839	0.766	0.690	0.543	0.419	0.300	0.216	0.157	0.117	0.053	0.023	0.002	0.000	0.000
8.00	0.06278	0.987	0.949	0.891	0.820	0.740	0.660	0.509	0.385	0.271	0.192	0.139	0.096	0.042	0.017	0.001	0.000	0.000
16.00	0.03233	0.986	0.946	0.885	0.810	0.728	0.645	0.492	0.369	0.257	0.181	0.130	0.086	0.037	0.015	0.001	0.000	0.000
32.00	0.01640	0.986	0.944	0.882	0.805	0.722	0.638	0.484	0.361	0.250	0.176	0.126	0.082	0.035	0.014	0.001	0.000	0.000
64.00	0.00826	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.357	0.247	0.173	0.122	0.079	0.034	0.014	0.001	0.000	0.000
128.00	0.00414	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.355	0.245	0.172	0.121	0.078	0.033	0.013	0.001	0.000	0.000
256.00	0.00208	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.355	0.245	0.171	0.120	0.078	0.033	0.013	0.001	0.000	0.000
512.00	0.00104	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.244	0.171	0.120	0.078	0.033	0.013	0.001	0.000	0.000

(b-8) Wall half-angle, 75°

0.25	0.55916	0.999	0.997	0.993	0.987	0.981	0.972	0.951	0.924	0.883	0.835	0.782	0.726	0.608	0.495	0.315	0.130	0.062
0.50	0.45210	0.998	0.991	0.979	0.963	0.943	0.919	0.862	0.794	0.702	0.608	0.518	0.438	0.308	0.217	0.113	0.037	0.016
1.00	0.32105	0.995	0.979	0.954	0.920	0.879	0.832	0.729	0.623	0.499	0.394	0.309	0.243	0.152	0.099	0.047	0.015	0.000
2.00	0.20001	0.991	0.966	0.926	0.874	0.814	0.749	0.616	0.494	0.368	0.274	0.204	0.155	0.092	0.059	0.027	0.004	0.000
4.00	0.11292	0.989	0.956	0.905	0.840	0.768	0.692	0.547	0.422	0.303	0.218	0.160	0.119	0.070	0.044	0.020	0.001	0.000
8.00	0.06008	0.987	0.949	0.892	0.821	0.742	0.661	0.511	0.387	0.272	0.193	0.140	0.103	0.060	0.037	0.017	0.000	0.000
16.00	0.03099	0.986	0.946	0.885	0.811	0.729	0.646	0.493	0.370	0.258	0.182	0.131	0.096	0.055	0.034	0.014	0.000	0.000
32.00	0.01574	0.986	0.945	0.882	0.805	0.722	0.638	0.485	0.362	0.251	0.176	0.126	0.093	0.053	0.033	0.013	0.000	0.000
64.00	0.00793	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.358	0.247	0.173	0.124	0.091	0.052	0.032	0.013	0.000	0.000
128.00	0.00398	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.356	0.245	0.172	0.123	0.090	0.052	0.032	0.012	0.000	0.000
256.00	0.00199	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.355	0.245	0.171	0.123	0.090	0.051	0.032	0.012	0.000	0.000
512.00	0.00100	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.244	0.171	0.122	0.090	0.051	0.032	0.012	0.000	0.000

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(c) Length to inlet width ratio, 1.00

(c-1) Wall half-angle, 0°

Axial distance from slot exit, $\frac{x}{x - L}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.61376	0.999	0.997	0.994	0.990	0.984	0.976	0.957	0.930	0.884	0.822	0.743	0.650	0.308	0.114	0.031	0.007	0.002
0.50	0.49514	0.997	0.988	0.974	0.954	0.928	0.896	0.819	0.727	0.517	0.340	0.210	0.123	0.058	0.031	0.012	0.003	0.001
1.00	0.33747	0.993	0.973	0.940	0.898	0.847	0.750	0.560	0.395	0.241	0.139	0.091	0.063	0.033	0.019	0.008	0.002	0.001
2.00	0.20158	0.990	0.961	0.894	0.795	0.691	0.590	0.410	0.272	0.154	0.100	0.068	0.047	0.025	0.015	0.006	0.002	0.001
4.00	0.11143	0.988	0.919	0.823	0.718	0.614	0.514	0.346	0.222	0.131	0.086	0.059	0.041	0.022	0.013	0.006	0.002	0.001
8.00	0.05887	0.969	0.885	0.785	0.679	0.575	0.478	0.315	0.199	0.122	0.080	0.055	0.039	0.021	0.013	0.005	0.002	0.001
16.00	0.03031	0.953	0.867	0.766	0.660	0.556	0.459	0.300	0.188	0.117	0.077	0.053	0.037	0.020	0.012	0.005	0.002	0.001
32.00	0.01539	0.944	0.858	0.757	0.650	0.546	0.450	0.293	0.182	0.115	0.076	0.052	0.037	0.020	0.012	0.005	0.002	0.001
64.00	0.00775	0.940	0.853	0.752	0.645	0.541	0.446	0.289	0.179	0.114	0.075	0.051	0.036	0.020	0.012	0.005	0.002	0.001
128.00	0.00389	0.938	0.851	0.749	0.643	0.539	0.444	0.287	0.178	0.113	0.075	0.051	0.036	0.020	0.012	0.005	0.002	0.001
256.00	0.00195	0.937	0.850	0.748	0.642	0.538	0.442	0.287	0.177	0.113	0.075	0.051	0.036	0.020	0.012	0.005	0.002	0.001
512.00	0.00098	0.936	0.849	0.748	0.641	0.537	0.442	0.286	0.177	0.113	0.075	0.051	0.036	0.020	0.012	0.005	0.002	0.001

(c-2) Wall half-angle, 5°

0.25	0.59609	1.000	0.998	0.996	0.992	0.988	0.982	0.968	0.949	0.916	0.873	0.816	0.744	0.529	0.226	0.042	0.007	0.003
0.50	0.49385	0.998	0.991	0.980	0.964	0.943	0.918	0.854	0.775	0.659	0.453	0.290	0.175	0.068	0.035	0.013	0.003	0.001
1.00	0.34743	0.994	0.976	0.947	0.908	0.862	0.809	0.637	0.458	0.283	0.166	0.098	0.066	0.034	0.019	0.008	0.002	0.001
2.00	0.21164	0.990	0.963	0.920	0.850	0.744	0.638	0.447	0.298	0.170	0.101	0.068	0.047	0.025	0.015	0.006	0.002	0.001
4.00	0.11811	0.988	0.954	0.867	0.758	0.649	0.545	0.367	0.235	0.130	0.085	0.057	0.040	0.022	0.013	0.005	0.002	0.001
8.00	0.06269	0.987	0.926	0.822	0.712	0.602	0.500	0.330	0.208	0.119	0.078	0.053	0.037	0.020	0.012	0.005	0.002	0.001
16.00	0.03235	0.986	0.905	0.800	0.688	0.580	0.479	0.312	0.195	0.114	0.075	0.051	0.036	0.019	0.012	0.005	0.001	0.001
32.00	0.01644	0.985	0.894	0.788	0.677	0.568	0.468	0.304	0.188	0.111	0.073	0.050	0.035	0.019	0.011	0.005	0.001	0.001
64.00	0.00829	0.980	0.889	0.782	0.671	0.563	0.463	0.300	0.185	0.110	0.072	0.049	0.035	0.019	0.011	0.005	0.001	0.001
128.00	0.00416	0.977	0.886	0.780	0.668	0.560	0.460	0.297	0.184	0.109	0.072	0.049	0.035	0.019	0.011	0.005	0.001	0.001
256.00	0.00208	0.976	0.885	0.778	0.667	0.558	0.459	0.296	0.183	0.109	0.072	0.049	0.035	0.019	0.011	0.005	0.001	0.001
512.00	0.00104	0.975	0.884	0.777	0.666	0.558	0.458	0.296	0.182	0.109	0.072	0.049	0.034	0.019	0.011	0.005	0.001	0.001

(c-3) Wall half-angle, 10°

0.25	0.57008	1.000	0.998	0.996	0.994	0.990	0.986	0.974	0.960	0.936	0.905	0.866	0.817	0.683	0.477	0.066	0.009	0.003
0.50	0.48284	0.998	0.993	0.984	0.972	0.956	0.936	0.886	0.821	0.723	0.617	0.430	0.272	0.090	0.042	0.014	0.003	0.001
1.00	0.35084	0.995	0.979	0.954	0.920	0.878	0.830	0.724	0.554	0.352	0.210	0.118	0.071	0.035	0.019	0.008	0.002	0.001
2.00	0.21870	0.991	0.965	0.924	0.871	0.810	0.708	0.502	0.338	0.194	0.104	0.067	0.046	0.024	0.014	0.006	0.002	0.001
4.00	0.12347	0.989	0.956	0.905	0.816	0.700	0.589	0.398	0.256	0.139	0.082	0.055	0.038	0.020	0.012	0.005	0.001	0.001
8.00	0.06591	0.987	0.950	0.875	0.758	0.642	0.534	0.352	0.222	0.117	0.075	0.050	0.035	0.019	0.011	0.005	0.001	0.001
16.00	0.03410	0.986	0.947	0.847	0.730	0.614	0.507	0.331	0.206	0.109	0.071	0.048	0.034	0.018	0.011	0.005	0.001	0.001
32.00	0.01735	0.986	0.945	0.833	0.715	0.600	0.494	0.320	0.198	0.107	0.069	0.047	0.033	0.018	0.010	0.004	0.001	0.001
64.00	0.00876	0.985	0.939	0.826	0.708	0.594	0.488	0.315	0.194	0.105	0.069	0.046	0.033	0.018	0.010	0.004	0.001	0.001
128.00	0.00440	0.985	0.936	0.823	0.705	0.590	0.485	0.313	0.192	0.105	0.068	0.046	0.032	0.017	0.010	0.004	0.001	0.001
256.00	0.00220	0.985	0.934	0.821	0.703	0.588	0.483	0.311	0.191	0.104	0.068	0.046	0.032	0.017	0.010	0.004	0.001	0.001
512.00	0.00110	0.985	0.933	0.820	0.702	0.588	0.482	0.311	0.191	0.104	0.068	0.046	0.032	0.017	0.010	0.004	0.001	0.001

(c-4) Wall half-angle, 20°

0.25	0.52368	1.000	0.999	0.997	0.995	0.991	0.988	0.978	0.966	0.947	0.924	0.896	0.864	0.784	0.676	0.327	0.013	0.003
0.50	0.45235	0.999	0.995	0.988	0.979	0.967	0.953	0.916	0.869	0.796	0.709	0.614	0.521	0.224	0.068	0.017	0.004	0.001
1.00	0.34186	0.996	0.984	0.963	0.936	0.901	0.861	0.767	0.664	0.526	0.329	0.194	0.107	0.038	0.020	0.008	0.002	0.001
2.00	0.22071	0.992	0.969	0.931	0.883	0.826	0.764	0.631	0.434	0.255	0.141	0.072	0.045	0.023	0.013	0.005	0.001	0.001
4.00	0.12703	0.989	0.958	0.908	0.846	0.776	0.691	0.472	0.307	0.170	0.086	0.052	0.035	0.018	0.011	0.004	0.001	0.001
8.00	0.06845	0.987	0.951	0.895	0.825	0.732	0.610	0.405	0.256	0.136	0.069	0.046	0.032	0.017	0.010	0.004	0.001	0.000
16.00	0.03558	0.986	0.947	0.887	0.813	0.692	0.572	0.374	0.233	0.121	0.065	0.043	0.030	0.016	0.009	0.004	0.001	0.000
32.00	0.01815	0.986	0.945	0.883	0.800	0.672	0.554	0.359	0.222	0.114	0.063	0.042	0.029	0.015	0.009	0.004	0.001	0.000
64.00	0.00917	0.985	0.944	0.881	0.790	0.662	0.545	0.352	0.217	0.111	0.062	0.041	0.029	0.015	0.009	0.004	0.001	0.000
128.00	0.00461	0.985	0.943	0.880	0.785	0.658	0.540	0.348	0.214	0.109	0.061	0.041	0.028	0.015	0.009	0.004	0.001	0.000
256.00	0.00231	0.985	0.943	0.879	0.783	0.655	0.538	0.347	0.213	0.109	0.061	0.041	0.028	0.015	0.009	0.004	0.001	0.000
512.00	0.00116	0.985	0.943	0.879	0.782	0.654	0.537	0.346	0.212	0.108	0.061	0.041	0.028	0.015	0.009	0.004	0.001	0.000

(c-5) Wall half-angle, 30°

0.25	0.47817	1.000	0.999	0.997	0.994	0.991	0.988	0.978	0.966	0.948	0.926	0.900	0.872	0.807	0.732	0.545	0.026	0.004
0.50	0.41564	0.999	0.995	0.990	0.982	0.971	0.959	0.928	0.889	0.831	0.763	0.687	0.604	0.444	0.229	0.022	0.004	0.001
1.00	0.32156	0.997	0.986	0.970	0.947	0.918	0.883	0.802	0.709	0.590	0.479	0.351	0.209	0.059	0.021	0.007	0.002	0.001
2.00	0.21386	0.993	0.972	0.938	0.893	0.841	0.782	0.659	0.541	0.366	0.212	0.116	0.057	0.021	0.012	0.005	0.001	0.000
4.00	0.12548	0.990	0.959	0.912	0.853	0.785	0.713	0.572	0.395	0.224	0.120	0.057	0.032	0.016	0.009	0.004	0.001	0.000
8.00	0.06828	0.988	0.952	0.897	0.828	0.752	0.674	0.492	0.316	0.172	0.087	0.041	0.027	0.014	0.008	0.003	0.001	0.000
16.00	0.03567	0.986	0.948	0.888	0.815	0.734	0.653	0.446	0.281	0.150	0.073	0.038	0.026	0.013	0.008	0.003	0.001	0.000
32.00	0.01824	0.986	0.945	0.884	0.808	0.725	0.642	0.424	0.265	0.140	0.067	0.036	0.025	0.013	0.007	0.003	0.001	0.000
64.00	0.00922	0.986	0.944	0.881	0.804	0.720	0.635	0.413	0.258	0.135	0.064	0.036	0.024	0.013	0.007	0.003	0.001	0.000
128.00	0.00464	0.985	0.943	0.880	0.802	0.718	0.628	0.408	0.254	0.132	0.063	0.035	0.024	0.012	0.007	0.003	0.001	0.000
256.00	0.00233	0.985	0.943	0.879	0.801	0.717	0.625	0.406	0.252	0.131	0.062	0.035	0.024	0.012	0.007	0.003	0.001	0.000
512.00	0.00116	0.985	0.943	0.879	0.801	0.716	0.623	0.404	0.251	0.130	0.061	0.035	0.024	0.012	0.007	0.003	0.001	0.000

(c-6) Wall half-angle, 45°

0.25	0.42695	1.000	0.998	0.997	0.994	0.991	0.986	0.976	0.963	0.943	0.919	0.893	0.863	0.797	0.726	0.582	0.313	0.012
0.50	0.36966	0.999	0.995	0.990	0.981	0.971	0.959	0.929	0.892	0.838	0.778	0.714	0.649	0.519	0.396	0.220	0.004	0.001
1.00	0.28864	0.997	0.988	0.973	0.952	0.927	0.897	0.826	0.746	0.639	0.534	0.438	0.357	0.237	0.079	0.007	0.001	0.000
2.00	0.19683	0.994	0.975	0.945	0.905	0.857	0.803	0.687	0.572	0.444	0.342	0.263	0.153	0.041	0.010	0.003	0.001	0.000
4.00	0.11811	0.990	0.962	0.917	0.860	0.795	0.726	0.587	0.464	0.341	0.222	0.123	0.064	0.013	0.007	0.003	0.001	0.000
8.00	0.06510	0.988	0.953	0.900	0.832	0.758	0.680	0.533	0.409	0.276	0.153	0.080	0.037	0.010	0.006	0.002	0.001	0.000
16.00	0.03423	0.987	0.948	0.890	0.817	0.737	0.656	0.505	0.381	0.232	0.126	0.063	0.026	0.010	0.005	0.002	0.001	0.000
32.00	0.01756	0.986	0.946	0.884	0.809	0.727	0.643	0.491	0.367	0.213	0.114	0.056	0.022	0.009	0.005	0.002	0.001	0.000
64.00	0.00889	0.986	0.944	0.882	0.805	0.721	0.637	0.483	0.360	0.204	0.108	0.052	0.020	0.009	0.005	0.002	0.001	0.000
128.00	0.00448	0.985	0.944	0.880	0.803	0.718	0.634	0.480	0.357	0.199	0.105	0.050	0.019	0.009	0.005	0.002	0.001	0.000
256.00	0.00224	0.985	0.943	0.879	0.801	0.717	0.632	0.478	0.355	0.197	0.104	0.050	0.018	0.009	0.005	0.002	0.001	0.000
512.00	0.00112	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.196	0.103	0.049	0.018	0.009	0.005	0.002	0.001	0.000

(c-7) Wall half-angle, 60°

0.25	0.39443	1.000	0.998	0.996	0.993	0.990	0.985	0.974	0.960	0.938	0.913	0.884	0.852	0.782	0.707	0.560	0.328	0.189
0.50	0.33873	0.999	0.995	0.989	0.980	0.969	0.956	0.924	0.885	0.829	0.767	0.703	0.639	0.517	0.412	0.254	0.095	0.001
1.00	0.26289	0.997	0.988	0.972	0.952	0.926	0.896	0.827	0.749	0.648	0.551	0.462	0.384	0.261	0.179	0.080	0.001	0.000
2.00	0.18011	0.994	0.976	0.947	0.909	0.863	0.812	0.702	0.590	0.465	0.361	0.280	0.218	0.136	0.069	0.003	0.000	0.000
4.00	0.10938	0.991	0.963	0.921	0.866	0.802	0.735	0.599	0.476	0.352	0.260	0.194	0.147	0.066	0.016	0.002	0.000	0.000
8.00	0.06085	0.988	0.954	0.902	0.836	0.762	0.685	0.539	0.415	0.297	0.214	0.156	0.113	0.035	0.004	0.001	0.000	0.000
16.00	0.03216	0.987	0.949	0.891	0.819	0.739	0.659	0.508	0.384	0.270	0.192	0.139	0.087	0.024	0.003	0.001	0.000	0.000
32.00	0.01654	0.986	0.946	0.885	0.810	0.728	0.645	0.492	0.369	0.257	0.181	0.130	0.076	0.019	0.003	0.001	0.000	0.000
64.00	0.00839	0.986	0.944	0.882	0.805	0.722	0.638	0.484	0.361	0.250	0.176	0.124	0.070	0.017	0.003	0.001	0.000	0.000
128.00	0.00422	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.357	0.247	0.173	0.120	0.068	0.016	0.003	0.001	0.000	0.000
256.00	0.00212	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.355	0.245	0.172	0.119	0.067	0.015	0.003	0.001	0.000	0.000
512.00	0.00106	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.355	0.245	0.171	0.118	0.066	0.015	0.003	0.001	0.000	0.000

(c-8) Wall half-angle, 75°

0.25	0.37642	1.000	0.998	0.996	0.993	0.989	0.984	0.972	0.957	0.935	0.908	0.877	0.844	0.770	0.693	0.541	0.308	0.176
0.50	0.32118	0.999	0.995	0.988	0.979	0.968	0.954	0.920	0.879	0.820	0.756	0.690	0.623	0.500	0.395	0.244	0.102	0.049
1.00	0.24712	0.997	0.987	0.971	0.950	0.923	0.892	0.820	0.741	0.638	0.541	0.454	0.379	0.263	0.185	0.096	0.033	0.013
2.00	0.16817	0.994	0.976	0.946	0.908	0.862	0.811	0.700	0.591	0.468	0.366	0.286	0.224	0.141	0.092	0.044	0.011	0.000
4.00	0.10213	0.991	0.964	0.921	0.867	0.805	0.738	0.603	0.482	0.358	0.265	0.198	0.150	0.090	0.057	0.027	0.000	0.000
8.00	0.05702	0.988	0.955	0.903	0.837	0.764	0.688	0.543	0.419	0.300	0.216	0.158	0.118	0.069	0.043	0.020	0.000	0.000
16.00	0.03023	0.987	0.949	0.891	0.820	0.741	0.660	0.510	0.386	0.272	0.193	0.140	0.103	0.060	0.037	0.016	0.000	0.000
32.00	0.01557	0.986	0.946	0.885	0.810	0.728	0.646	0.493	0.370	0.258	0.182	0.131	0.096	0.055	0.034	0.013	0.000	0.000
64.00	0.00791	0.986	0.945	0.882	0.805	0.722	0.638	0.485	0.362	0.251	0.176	0.126	0.093	0.053	0.033	0.011	0.000	0.000
128.00	0.00398	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.358	0.247	0.173	0.124	0.091	0.052	0.032	0.011	0.000	0.000
256.00	0.00200	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.356	0.245	0.172	0.123	0.090	0.052	0.032	0.010	0.000	0.000
512.00	0.00100	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.355	0.245	0.171	0.123	0.090	0.051	0.032	0.010	0.000	0.000

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(d) Length to inlet width ratio, 2.00

(d-1) Wall half-angle, 0°

Axial distance from slot exit, $\frac{x}{x - L}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.48806	0.999	0.998	0.995	0.991	0.986	0.979	0.962	0.938	0.896	0.840	0.768	0.684	0.258	0.104	0.029	0.006	0.002
0.50	0.40032	0.997	0.990	0.977	0.959	0.936	0.908	0.838	0.756	0.497	0.280	0.172	0.111	0.052	0.028	0.011	0.003	0.001
1.00	0.28188	0.994	0.976	0.948	0.910	0.866	0.746	0.514	0.316	0.190	0.120	0.080	0.055	0.029	0.017	0.007	0.002	0.001
2.00	0.17626	0.991	0.966	0.887	0.760	0.632	0.509	0.310	0.205	0.128	0.083	0.056	0.040	0.021	0.013	0.005	0.002	0.001
4.00	0.10206	0.989	0.894	0.763	0.630	0.502	0.385	0.246	0.165	0.104	0.069	0.047	0.033	0.018	0.011	0.005	0.001	0.001
8.00	0.05591	0.953	0.828	0.693	0.559	0.433	0.332	0.217	0.147	0.093	0.061	0.042	0.030	0.016	0.010	0.004	0.001	0.001
16.00	0.02946	0.921	0.792	0.655	0.520	0.396	0.309	0.203	0.138	0.088	0.058	0.040	0.028	0.015	0.009	0.004	0.001	0.000
32.00	0.01516	0.904	0.774	0.635	0.501	0.377	0.298	0.196	0.133	0.085	0.056	0.038	0.027	0.015	0.009	0.004	0.001	0.000
64.00	0.00769	0.895	0.764	0.625	0.490	0.367	0.292	0.193	0.131	0.083	0.055	0.038	0.027	0.015	0.009	0.004	0.001	0.000
128.00	0.00388	0.891	0.759	0.620	0.485	0.363	0.289	0.191	0.130	0.083	0.055	0.038	0.027	0.015	0.009	0.004	0.001	0.000
256.00	0.00195	0.889	0.757	0.618	0.483	0.360	0.288	0.190	0.129	0.082	0.054	0.037	0.026	0.014	0.009	0.004	0.001	0.000
512.00	0.00097	0.888	0.755	0.616	0.481	0.359	0.287	0.190	0.129	0.082	0.054	0.037	0.026	0.014	0.009	0.004	0.001	0.000

(d-2) Wall half-angle, 5°

0.25	0.46329	1.000	0.999	0.997	0.995	0.992	0.989	0.979	0.967	0.947	0.920	0.885	0.839	0.709	0.379	0.057	0.009	0.003
0.50	0.39845	0.998	0.994	0.986	0.975	0.961	0.943	0.897	0.838	0.748	0.582	0.343	0.186	0.077	0.038	0.013	0.003	0.001
1.00	0.29682	0.995	0.982	0.959	0.929	0.891	0.848	0.708	0.477	0.249	0.150	0.095	0.064	0.032	0.018	0.007	0.002	0.001
2.00	0.19224	0.992	0.969	0.933	0.887	0.760	0.627	0.390	0.232	0.140	0.089	0.060	0.041	0.022	0.013	0.005	0.002	0.001
4.00	0.11328	0.990	0.961	0.866	0.725	0.587	0.459	0.265	0.174	0.108	0.070	0.047	0.033	0.018	0.011	0.005	0.001	0.001
8.00	0.06263	0.988	0.918	0.776	0.632	0.497	0.375	0.227	0.150	0.094	0.061	0.042	0.029	0.016	0.009	0.004	0.001	0.001
16.00	0.03317	0.987	0.873	0.728	0.584	0.450	0.332	0.209	0.139	0.087	0.057	0.039	0.028	0.015	0.009	0.004	0.001	0.000
32.00	0.01711	0.986	0.849	0.703	0.559	0.427	0.311	0.200	0.134	0.084	0.055	0.038	0.027	0.014	0.009	0.004	0.001	0.000
64.00	0.00869	0.976	0.837	0.690	0.547	0.415	0.304	0.196	0.131	0.083	0.054	0.037	0.026	0.014	0.008	0.004	0.001	0.000
128.00	0.00438	0.970	0.831	0.684	0.540	0.409	0.300	0.194	0.130	0.082	0.054	0.037	0.026	0.014	0.008	0.004	0.001	0.000
256.00	0.00220	0.967	0.828	0.681	0.537	0.406	0.298	0.193	0.129	0.081	0.053	0.037	0.026	0.014	0.008	0.004	0.001	0.000
512.00	0.00110	0.966	0.827	0.679	0.536	0.404	0.297	0.192	0.129	0.081	0.053	0.036	0.026	0.014	0.008	0.004	0.001	0.000

(d-3) Wall half-angle, 10°

0.25	0.42686	1.000	0.999	0.998	0.997	0.995	0.993	0.987	0.979	0.967	0.952	0.934	0.911	0.849	0.756	0.251	0.014	0.004
0.50	0.37894	0.999	0.996	0.992	0.985	0.976	0.965	0.937	0.900	0.839	0.763	0.678	0.517	0.145	0.060	0.018	0.004	0.002
1.00	0.29705	0.997	0.987	0.970	0.947	0.918	0.883	0.802	0.712	0.449	0.224	0.126	0.080	0.038	0.020	0.008	0.002	0.001
2.00	0.20037	0.993	0.973	0.941	0.899	0.849	0.795	0.533	0.313	0.161	0.099	0.064	0.044	0.022	0.013	0.005	0.002	0.001
4.00	0.12063	0.990	0.963	0.919	0.859	0.709	0.566	0.326	0.187	0.112	0.071	0.047	0.033	0.017	0.010	0.004	0.001	0.001
8.00	0.06741	0.988	0.955	0.891	0.736	0.587	0.452	0.239	0.154	0.094	0.061	0.041	0.029	0.015	0.009	0.004	0.001	0.000
16.00	0.03590	0.987	0.950	0.828	0.672	0.525	0.395	0.215	0.140	0.086	0.056	0.038	0.026	0.014	0.008	0.004	0.001	0.000
32.00	0.01857	0.986	0.947	0.796	0.640	0.495	0.367	0.204	0.133	0.083	0.054	0.036	0.025	0.014	0.008	0.003	0.001	0.000
64.00	0.00945	0.986	0.938	0.779	0.623	0.479	0.353	0.199	0.130	0.081	0.052	0.035	0.025	0.013	0.008	0.003	0.001	0.000
128.00	0.00477	0.985	0.930	0.771	0.615	0.471	0.346	0.196	0.129	0.080	0.052	0.035	0.025	0.013	0.008	0.003	0.001	0.000
256.00	0.00240	0.985	0.926	0.767	0.611	0.468	0.343	0.195	0.128	0.079	0.052	0.035	0.025	0.013	0.008	0.003	0.001	0.000
512.00	0.00120	0.985	0.924	0.765	0.609	0.466	0.341	0.194	0.127	0.079	0.051	0.035	0.024	0.013	0.008	0.003	0.001	0.000

(d-4) Wall half-angle, 20°

0.25	0.36843	1.000	0.999	0.999	0.998	0.996	0.995	0.990	0.985	0.976	0.966	0.954	0.940	0.906	0.865	0.750	0.067	0.007
0.50	0.33453	0.999	0.998	0.995	0.991	0.985	0.979	0.962	0.941	0.907	0.865	0.815	0.754	0.612	0.327	0.034	0.005	0.002
1.00	0.27580	0.998	0.991	0.981	0.966	0.947	0.924	0.866	0.796	0.696	0.596	0.377	0.173	0.055	0.026	0.009	0.002	0.001
2.00	0.19689	0.995	0.979	0.953	0.918	0.876	0.828	0.724	0.592	0.306	0.127	0.076	0.049	0.024	0.013	0.005	0.001	0.001
4.00	0.12279	0.991	0.966	0.926	0.875	0.815	0.751	0.512	0.284	0.124	0.074	0.048	0.032	0.016	0.009	0.004	0.001	0.000
8.00	0.06987	0.989	0.957	0.907	0.844	0.774	0.623	0.355	0.169	0.095	0.059	0.039	0.026	0.014	0.008	0.003	0.001	0.000
16.00	0.03755	0.987	0.951	0.895	0.825	0.689	0.533	0.285	0.142	0.084	0.053	0.035	0.024	0.013	0.007	0.003	0.001	0.000
32.00	0.01952	0.986	0.947	0.887	0.812	0.641	0.489	0.253	0.133	0.079	0.050	0.033	0.023	0.012	0.007	0.003	0.001	0.000
64.00	0.00996	0.986	0.945	0.883	0.786	0.617	0.468	0.237	0.128	0.076	0.048	0.032	0.022	0.012	0.007	0.003	0.001	0.000
128.00	0.00503	0.985	0.944	0.881	0.774	0.605	0.457	0.229	0.126	0.075	0.048	0.032	0.022	0.012	0.007	0.003	0.001	0.000
256.00	0.00253	0.985	0.943	0.880	0.768	0.600	0.452	0.225	0.125	0.075	0.047	0.032	0.022	0.012	0.007	0.003	0.001	0.000
512.00	0.00127	0.985	0.943	0.879	0.765	0.597	0.449	0.223	0.124	0.074	0.047	0.031	0.022	0.012	0.007	0.003	0.001	0.000

(d-5) Wall half-angle, 30°

0.25	0.31790	1.000	0.999	0.999	0.998	0.996	0.995	0.991	0.986	0.978	0.968	0.957	0.945	0.915	0.881	0.799	0.588	0.038
0.50	0.29046	0.999	0.998	0.996	0.992	0.988	0.982	0.969	0.951	0.925	0.894	0.858	0.818	0.726	0.617	0.323	0.008	0.002
1.00	0.24495	0.998	0.994	0.985	0.974	0.960	0.943	0.900	0.848	0.770	0.683	0.594	0.510	0.208	0.042	0.011	0.002	0.001
2.00	0.18195	0.996	0.983	0.962	0.933	0.898	0.858	0.765	0.665	0.546	0.376	0.167	0.063	0.026	0.013	0.005	0.001	0.000
4.00	0.11732	0.992	0.969	0.933	0.885	0.830	0.770	0.645	0.523	0.249	0.084	0.050	0.032	0.015	0.008	0.003	0.001	0.000
8.00	0.06800	0.989	0.959	0.911	0.850	0.782	0.710	0.559	0.309	0.113	0.058	0.036	0.024	0.012	0.007	0.003	0.001	0.000
16.00	0.03689	0.988	0.952	0.897	0.828	0.752	0.673	0.439	0.224	0.082	0.049	0.031	0.021	0.011	0.006	0.003	0.001	0.000
32.00	0.01926	0.986	0.948	0.888	0.815	0.735	0.653	0.385	0.187	0.075	0.045	0.029	0.020	0.010	0.006	0.002	0.001	0.000
64.00	0.00985	0.986	0.945	0.884	0.808	0.725	0.642	0.359	0.169	0.072	0.044	0.028	0.019	0.010	0.006	0.002	0.001	0.000
128.00	0.00498	0.986	0.944	0.881	0.804	0.720	0.630	0.347	0.160	0.070	0.043	0.028	0.019	0.010	0.006	0.002	0.001	0.000
256.00	0.00251	0.985	0.943	0.880	0.802	0.718	0.622	0.340	0.156	0.070	0.042	0.027	0.019	0.010	0.006	0.002	0.001	0.000
512.00	0.00126	0.985	0.943	0.879	0.801	0.717	0.618	0.337	0.154	0.069	0.042	0.027	0.019	0.010	0.006	0.002	0.001	0.000

(d-6) Wall half-angle, 45°

0.25	0.26696	1.000	0.999	0.999	0.998	0.996	0.995	0.991	0.985	0.977	0.967	0.956	0.943	0.913	0.879	0.800	0.626	0.463
0.50	0.24350	1.000	0.998	0.996	0.992	0.988	0.982	0.969	0.952	0.927	0.897	0.864	0.828	0.750	0.669	0.511	0.246	0.003
1.00	0.20654	0.999	0.994	0.987	0.977	0.964	0.949	0.913	0.868	0.805	0.736	0.665	0.592	0.455	0.339	0.025	0.002	0.001
2.00	0.15710	0.996	0.986	0.968	0.945	0.915	0.881	0.802	0.714	0.602	0.497	0.406	0.331	0.120	0.017	0.004	0.001	0.000
4.00	0.10466	0.993	0.973	0.941	0.898	0.847	0.792	0.673	0.558	0.432	0.332	0.199	0.072	0.015	0.007	0.002	0.001	0.000
8.00	0.06207	0.990	0.961	0.916	0.858	0.792	0.722	0.584	0.461	0.339	0.171	0.053	0.022	0.010	0.005	0.002	0.000	0.000
16.00	0.03409	0.988	0.953	0.899	0.832	0.757	0.680	0.532	0.409	0.246	0.093	0.028	0.017	0.008	0.004	0.002	0.000	0.000
32.00	0.01791	0.987	0.948	0.890	0.817	0.737	0.656	0.505	0.381	0.194	0.062	0.025	0.016	0.007	0.004	0.002	0.000	0.000
64.00	0.00919	0.986	0.946	0.884	0.809	0.727	0.644	0.491	0.368	0.170	0.049	0.023	0.015	0.007	0.004	0.001	0.000	0.000
128.00	0.00466	0.986	0.944	0.882	0.805	0.721	0.637	0.483	0.361	0.159	0.043	0.022	0.014	0.007	0.004	0.001	0.000	0.000
256.00	0.00234	0.985	0.944	0.880	0.803	0.718	0.634	0.480	0.357	0.153	0.040	0.022	0.014	0.007	0.004	0.001	0.000	0.000
512.00	0.00118	0.985	0.943	0.879	0.802	0.717	0.632	0.478	0.355	0.151	0.038	0.022	0.014	0.007	0.004	0.001	0.000	0.000

(d-7) Wall half-angle, 60°

0.25	0.23718	1.000	0.999	0.999	0.997	0.996	0.994	0.990	0.984	0.976	0.965	0.953	0.940	0.908	0.872	0.790	0.613	0.455
0.50	0.21539	0.999	0.998	0.995	0.992	0.987	0.981	0.967	0.950	0.923	0.893	0.858	0.821	0.742	0.661	0.509	0.287	0.156
1.00	0.18182	0.999	0.994	0.987	0.976	0.964	0.948	0.911	0.866	0.804	0.736	0.668	0.601	0.478	0.375	0.224	0.020	0.001
2.00	0.13834	0.997	0.986	0.969	0.946	0.918	0.886	0.810	0.728	0.623	0.525	0.436	0.360	0.244	0.169	0.028	0.001	0.000
4.00	0.09316	0.994	0.975	0.944	0.904	0.856	0.803	0.690	0.577	0.453	0.351	0.272	0.212	0.133	0.034	0.002	0.000	0.000
8.00	0.05601	0.990	0.963	0.919	0.863	0.799	0.731	0.594	0.472	0.349	0.258	0.193	0.146	0.037	0.004	0.001	0.000	0.000
16.00	0.03104	0.988	0.954	0.901	0.835	0.761	0.684	0.538	0.414	0.296	0.213	0.156	0.104	0.007	0.003	0.001	0.000	0.000
32.00	0.01639	0.987	0.949	0.891	0.819	0.739	0.659	0.508	0.384	0.270	0.192	0.139	0.069	0.006	0.003	0.001	0.000	0.000
64.00	0.00843	0.986	0.946	0.885	0.810	0.728	0.645	0.492	0.369	0.257	0.181	0.130	0.055	0.005	0.002	0.001	0.000	0.000
128.00	0.00428	0.986	0.944	0.882	0.805	0.722	0.638	0.484	0.361	0.250	0.176	0.122	0.048	0.005	0.002	0.001	0.000	0.000
256.00	0.00215	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.357	0.247	0.173	0.116	0.045	0.005	0.002	0.001	0.000	0.000
512.00	0.00108	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.355	0.245	0.172	0.114	0.043	0.005	0.002	0.001	0.000	0.000

(d-8) Wall half-angle, 75°

0.25	0.22133	1.000	0.999	0.999	0.997	0.996	0.994	0.989	0.984	0.975	0.964	0.951	0.937	0.904	0.867	0.782	0.600	0.440
0.50	0.20031	0.999	0.998	0.995	0.991	0.986	0.981	0.966	0.948	0.920	0.888	0.853	0.814	0.733	0.650	0.496	0.277	0.158
1.00	0.16822	0.998	0.994	0.986	0.976	0.962	0.946	0.908	0.862	0.797	0.728	0.659	0.591	0.468	0.367	0.226	0.094	0.045
2.00	0.12724	0.996	0.986	0.969	0.945	0.916	0.883	0.807	0.724	0.619	0.522	0.436	0.362	0.251	0.176	0.092	0.032	0.004
4.00	0.08543	0.994	0.974	0.944	0.904	0.857	0.804	0.692	0.581	0.458	0.358	0.279	0.219	0.137	0.090	0.043	0.005	0.000
8.00	0.05147	0.991	0.963	0.920	0.865	0.802	0.734	0.599	0.478	0.355	0.263	0.197	0.149	0.089	0.057	0.026	0.000	0.000
16.00	0.02864	0.988	0.954	0.902	0.837	0.763	0.687	0.541	0.418	0.299	0.216	0.158	0.118	0.069	0.043	0.020	0.000	0.000
32.00	0.01517	0.987	0.949	0.891	0.820	0.741	0.660	0.510	0.386	0.271	0.193	0.140	0.103	0.060	0.037	0.015	0.000	0.000
64.00	0.00781	0.986	0.946	0.885	0.810	0.728	0.646	0.493	0.370	0.258	0.182	0.131	0.096	0.055	0.034	0.010	0.000	0.000
128.00	0.00397	0.986	0.945	0.882	0.805	0.722	0.638	0.485	0.362	0.251	0.176	0.126	0.093	0.053	0.033	0.008	0.000	0.000
256.00	0.00200	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.358	0.247	0.173	0.124	0.091	0.052	0.032	0.007	0.000	0.000
512.00	0.00100	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.356	0.246	0.172	0.123	0.090	0.052	0.032	0.006	0.000	0.000

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(e) Length to inlet width ratio, 4.00

(e-1) Wall half-angle, 0°

Axial distance from slot exit, $\frac{x}{L} - 1$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$: .1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.36128	0.999	0.998	0.995	0.992	0.987	0.981	0.965	0.944	0.906	0.855	0.790	0.714	0.231	0.095	0.026	0.006	0.002
0.50	0.30124	0.998	0.991	0.979	0.963	0.943	0.917	0.855	0.782	0.432	0.247	0.153	0.099	0.047	0.025	0.010	0.003	0.001
1.00	0.21932	0.995	0.979	0.955	0.922	0.883	0.719	0.422	0.270	0.164	0.104	0.069	0.048	0.025	0.014	0.006	0.002	0.001
2.00	0.14422	0.993	0.972	0.867	0.685	0.506	0.392	0.252	0.168	0.105	0.069	0.047	0.033	0.018	0.010	0.004	0.001	0.001
4.00	0.08846	0.991	0.844	0.648	0.469	0.363	0.289	0.189	0.128	0.081	0.053	0.036	0.026	0.014	0.008	0.004	0.001	0.000
8.00	0.05105	0.923	0.719	0.514	0.382	0.300	0.241	0.159	0.108	0.069	0.045	0.031	0.022	0.012	0.007	0.003	0.001	0.000
16.00	0.02795	0.859	0.647	0.448	0.341	0.269	0.216	0.143	0.097	0.062	0.041	0.028	0.020	0.011	0.007	0.003	0.001	0.000
32.00	0.01473	0.825	0.607	0.418	0.319	0.253	0.203	0.135	0.092	0.059	0.039	0.027	0.019	0.010	0.006	0.003	0.001	0.000
64.00	0.00758	0.807	0.587	0.404	0.309	0.245	0.197	0.131	0.089	0.057	0.038	0.026	0.018	0.010	0.006	0.003	0.001	0.000
128.00	0.00385	0.797	0.576	0.396	0.303	0.241	0.194	0.129	0.088	0.056	0.037	0.026	0.018	0.010	0.006	0.003	0.001	0.000
256.00	0.00194	0.793	0.571	0.393	0.301	0.238	0.192	0.128	0.087	0.056	0.037	0.025	0.018	0.010	0.006	0.003	0.001	0.000
512.00	0.00097	0.790	0.568	0.391	0.299	0.237	0.191	0.127	0.087	0.055	0.037	0.025	0.018	0.010	0.006	0.003	0.001	0.000

(e-2) Wall half-angle, 5°

0.25	0.33070	1.000	0.999	0.999	0.997	0.996	0.994	0.989	0.983	0.973	0.960	0.943	0.922	0.862	0.763	0.142	0.012	0.004
0.50	0.29685	0.999	0.997	0.992	0.986	0.978	0.968	0.942	0.907	0.849	0.776	0.661	0.324	0.114	0.052	0.016	0.004	0.001
1.00	0.23709	0.997	0.988	0.972	0.951	0.925	0.893	0.820	0.614	0.295	0.171	0.106	0.070	0.034	0.019	0.008	0.002	0.001
2.00	0.16569	0.994	0.977	0.949	0.912	0.855	0.667	0.356	0.222	0.133	0.084	0.056	0.039	0.020	0.012	0.005	0.001	0.001
4.00	0.10489	0.992	0.968	0.907	0.701	0.504	0.365	0.226	0.148	0.092	0.060	0.040	0.028	0.015	0.009	0.004	0.001	0.000
8.00	0.06164	0.990	0.930	0.713	0.503	0.361	0.280	0.178	0.119	0.074	0.049	0.033	0.023	0.013	0.008	0.003	0.001	0.000
16.00	0.03413	0.988	0.827	0.605	0.408	0.309	0.243	0.156	0.105	0.066	0.043	0.030	0.021	0.011	0.007	0.003	0.001	0.000
32.00	0.01810	0.987	0.771	0.546	0.373	0.285	0.225	0.146	0.098	0.062	0.041	0.028	0.020	0.011	0.006	0.003	0.001	0.000
64.00	0.00934	0.972	0.742	0.516	0.356	0.273	0.216	0.140	0.094	0.060	0.039	0.027	0.019	0.010	0.006	0.003	0.001	0.000
128.00	0.00475	0.959	0.728	0.501	0.348	0.267	0.211	0.137	0.092	0.058	0.038	0.026	0.019	0.010	0.006	0.003	0.001	0.000
256.00	0.00240	0.952	0.720	0.493	0.344	0.264	0.209	0.136	0.091	0.058	0.038	0.026	0.018	0.010	0.006	0.003	0.001	0.000
512.00	0.00120	0.948	0.716	0.489	0.342	0.263	0.208	0.135	0.091	0.058	0.038	0.026	0.018	0.010	0.006	0.003	0.001	0.000

(e-3) Wall half-angle, 10°

0.25	0.28909	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.991	0.987	0.980	0.973	0.965	0.944	0.917	0.828	0.066	0.008
0.50	0.26834	1.000	0.998	0.997	0.994	0.990	0.986	0.975	0.960	0.936	0.904	0.863	0.812	0.683	0.198	0.035	0.006	0.002
1.00	0.22860	0.998	0.993	0.985	0.973	0.958	0.940	0.892	0.833	0.747	0.525	0.226	0.129	0.053	0.027	0.010	0.002	0.001
2.00	0.17048	0.996	0.982	0.961	0.932	0.897	0.856	0.753	0.390	0.188	0.111	0.070	0.047	0.023	0.013	0.005	0.002	0.001
4.00	0.11211	0.993	0.972	0.938	0.895	0.819	0.608	0.291	0.177	0.104	0.066	0.044	0.030	0.016	0.009	0.004	0.001	0.000
8.00	0.06722	0.990	0.963	0.919	0.746	0.527	0.345	0.202	0.129	0.079	0.051	0.034	0.024	0.013	0.007	0.003	0.001	0.000
16.00	0.03763	0.989	0.955	0.823	0.590	0.379	0.277	0.169	0.110	0.068	0.044	0.030	0.021	0.011	0.007	0.003	0.001	0.000
32.00	0.02008	0.987	0.950	0.740	0.509	0.331	0.249	0.154	0.101	0.063	0.041	0.028	0.019	0.010	0.006	0.003	0.001	0.000
64.00	0.01040	0.986	0.945	0.698	0.468	0.311	0.236	0.147	0.096	0.060	0.039	0.026	0.019	0.010	0.006	0.003	0.001	0.000
128.00	0.00530	0.986	0.924	0.676	0.447	0.302	0.230	0.143	0.094	0.059	0.038	0.026	0.018	0.010	0.006	0.003	0.001	0.000
256.00	0.00267	0.985	0.913	0.665	0.436	0.297	0.226	0.142	0.093	0.058	0.038	0.026	0.018	0.010	0.006	0.002	0.001	0.000
512.00	0.00134	0.985	0.908	0.660	0.431	0.295	0.225	0.141	0.093	0.058	0.038	0.026	0.018	0.010	0.006	0.002	0.001	0.000

(e-4) Wall half-angle, 20°

0.25	0.23268	1.000	1.000	0.999	0.999	0.999	0.998	0.996	0.994	0.991	0.987	0.983	0.978	0.965	0.950	0.913	0.805	0.575
0.50	0.21978	1.000	0.999	0.998	0.997	0.995	0.992	0.986	0.979	0.967	0.952	0.935	0.915	0.866	0.802	0.614	0.015	0.003
1.00	0.19578	0.999	0.997	0.993	0.987	0.979	0.970	0.947	0.917	0.870	0.811	0.743	0.670	0.261	0.065	0.015	0.003	0.001
2.00	0.15675	0.997	0.989	0.976	0.957	0.933	0.905	0.837	0.760	0.659	0.325	0.128	0.073	0.031	0.016	0.006	0.002	0.001
4.00	0.10930	0.994	0.977	0.949	0.912	0.869	0.820	0.715	0.382	0.144	0.081	0.050	0.033	0.016	0.009	0.004	0.001	0.000
8.00	0.06770	0.991	0.966	0.926	0.874	0.815	0.752	0.331	0.156	0.087	0.053	0.034	0.023	0.012	0.007	0.003	0.001	0.000
16.00	0.03856	0.989	0.957	0.908	0.845	0.741	0.506	0.202	0.119	0.069	0.043	0.028	0.020	0.010	0.006	0.003	0.001	0.000
32.00	0.02076	0.987	0.951	0.895	0.826	0.609	0.388	0.172	0.104	0.061	0.039	0.026	0.018	0.009	0.005	0.002	0.001	0.000
64.00	0.01080	0.986	0.947	0.888	0.795	0.544	0.331	0.159	0.098	0.058	0.037	0.024	0.017	0.009	0.005	0.002	0.001	0.000
128.00	0.00552	0.986	0.945	0.883	0.760	0.512	0.303	0.153	0.095	0.056	0.036	0.024	0.017	0.009	0.005	0.002	0.001	0.000
256.00	0.00279	0.985	0.944	0.881	0.743	0.496	0.289	0.150	0.093	0.056	0.035	0.024	0.016	0.009	0.005	0.002	0.001	0.000
512.00	0.00140	0.985	0.943	0.880	0.734	0.488	0.282	0.149	0.092	0.055	0.035	0.023	0.016	0.009	0.005	0.002	0.001	0.000

(e-5) Wall half-angle, 30°

0.25	0.19049	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.992	0.989	0.985	0.981	0.970	0.957	0.926	0.843	0.741
0.50	0.18067	1.000	0.999	0.998	0.997	0.996	0.994	0.989	0.982	0.973	0.961	0.947	0.932	0.896	0.854	0.756	0.485	0.008
1.00	0.16321	0.999	0.998	0.994	0.990	0.985	0.978	0.962	0.941	0.909	0.871	0.828	0.780	0.670	0.551	0.045	0.004	0.001
2.00	0.13521	0.998	0.992	0.983	0.970	0.953	0.933	0.884	0.824	0.739	0.649	0.562	0.469	0.058	0.023	0.007	0.001	0.001
4.00	0.09860	0.995	0.981	0.959	0.928	0.891	0.849	0.754	0.655	0.538	0.172	0.069	0.040	0.017	0.009	0.003	0.001	0.000
8.00	0.06305	0.992	0.969	0.932	0.884	0.829	0.769	0.644	0.428	0.112	0.058	0.035	0.023	0.011	0.006	0.002	0.001	0.000
16.00	0.03653	0.989	0.959	0.911	0.851	0.783	0.711	0.503	0.155	0.073	0.042	0.026	0.017	0.009	0.005	0.002	0.001	0.000
32.00	0.01985	0.988	0.952	0.897	0.829	0.753	0.674	0.341	0.116	0.061	0.036	0.023	0.015	0.008	0.005	0.002	0.001	0.000
64.00	0.01038	0.986	0.948	0.889	0.815	0.735	0.654	0.268	0.104	0.056	0.033	0.021	0.015	0.007	0.004	0.002	0.001	0.000
128.00	0.00531	0.986	0.945	0.884	0.808	0.726	0.642	0.234	0.098	0.053	0.032	0.021	0.014	0.007	0.004	0.002	0.000	0.000
256.00	0.00269	0.986	0.944	0.881	0.804	0.721	0.621	0.217	0.096	0.052	0.032	0.020	0.014	0.007	0.004	0.002	0.000	0.000
512.00	0.00135	0.985	0.944	0.880	0.802	0.718	0.609	0.209	0.095	0.052	0.031	0.020	0.014	0.007	0.004	0.002	0.000	0.000

(e-6) Wall half-angle, 45°

0.25	0.15207	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.993	0.989	0.986	0.981	0.971	0.959	0.929	0.850	0.757
0.50	0.14420	1.000	0.999	0.998	0.997	0.996	0.994	0.989	0.983	0.974	0.963	0.950	0.935	0.902	0.863	0.777	0.591	0.424
1.00	0.13059	0.999	0.998	0.995	0.991	0.986	0.980	0.965	0.946	0.918	0.885	0.849	0.809	0.726	0.640	0.475	0.020	0.002
2.00	0.10960	0.998	0.994	0.986	0.975	0.961	0.944	0.904	0.856	0.789	0.716	0.641	0.567	0.432	0.325	0.012	0.001	0.000
4.00	0.08234	0.996	0.985	0.966	0.941	0.910	0.875	0.792	0.703	0.590	0.487	0.399	0.326	0.030	0.010	0.003	0.001	0.000
8.00	0.05440	0.993	0.972	0.939	0.896	0.845	0.789	0.670	0.556	0.431	0.332	0.100	0.028	0.010	0.005	0.002	0.000	0.000
16.00	0.03219	0.990	0.961	0.916	0.858	0.792	0.722	0.584	0.462	0.340	0.077	0.027	0.016	0.007	0.004	0.001	0.000	0.000
32.00	0.01769	0.988	0.953	0.899	0.832	0.758	0.680	0.533	0.410	0.191	0.038	0.020	0.012	0.006	0.003	0.001	0.000	0.000
64.00	0.00930	0.987	0.948	0.890	0.817	0.738	0.657	0.506	0.382	0.118	0.032	0.018	0.011	0.005	0.003	0.001	0.000	0.000
128.00	0.00477	0.986	0.946	0.884	0.809	0.727	0.644	0.491	0.368	0.086	0.030	0.017	0.011	0.005	0.003	0.001	0.000	0.000
256.00	0.00242	0.986	0.944	0.882	0.805	0.721	0.637	0.484	0.361	0.070	0.029	0.016	0.010	0.005	0.003	0.001	0.000	0.000
512.00	0.00122	0.985	0.944	0.880	0.803	0.718	0.634	0.480	0.357	0.063	0.028	0.016	0.010	0.005	0.003	0.001	0.000	0.000

(e-7) Wall half-angle, 60°

0.25	0.13095	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.992	0.989	0.985	0.981	0.970	0.958	0.927	0.847	0.754
0.50	0.12398	1.000	0.999	0.998	0.997	0.996	0.994	0.989	0.983	0.973	0.962	0.949	0.934	0.900	0.861	0.774	0.591	0.432
1.00	0.11204	0.999	0.998	0.995	0.991	0.986	0.980	0.965	0.946	0.917	0.884	0.848	0.809	0.726	0.643	0.489	0.271	0.147
2.00	0.09391	0.998	0.994	0.986	0.975	0.961	0.945	0.906	0.859	0.793	0.724	0.653	0.585	0.462	0.360	0.215	0.003	0.000
4.00	0.07086	0.996	0.986	0.968	0.944	0.915	0.881	0.804	0.719	0.613	0.514	0.427	0.352	0.240	0.166	0.005	0.000	0.000
8.00	0.04739	0.993	0.974	0.943	0.902	0.854	0.800	0.686	0.573	0.449	0.349	0.271	0.211	0.132	0.007	0.001	0.000	0.000
16.00	0.02840	0.990	0.962	0.919	0.863	0.798	0.730	0.594	0.472	0.349	0.258	0.193	0.146	0.008	0.003	0.001	0.000	0.000
32.00	0.01573	0.988	0.954	0.901	0.835	0.761	0.685	0.538	0.415	0.297	0.214	0.156	0.086	0.005	0.002	0.001	0.000	0.000
64.00	0.00831	0.987	0.949	0.891	0.819	0.740	0.659	0.508	0.385	0.270	0.192	0.139	0.035	0.004	0.002	0.001	0.000	0.000
128.00	0.00427	0.986	0.946	0.885	0.810	0.728	0.645	0.492	0.369	0.257	0.181	0.130	0.014	0.004	0.002	0.001	0.000	0.000
256.00	0.00217	0.986	0.944	0.882	0.805	0.722	0.638	0.484	0.361	0.250	0.176	0.117	0.011	0.003	0.002	0.001	0.000	0.000
512.00	0.00109	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.357	0.247	0.173	0.109	0.010	0.003	0.002	0.001	0.000	0.000

(e-8) Wall half-angle, 75°

0.25	0.11992	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.992	0.989	0.985	0.980	0.970	0.957	0.925	0.844	0.748
0.50	0.11340	1.000	0.999	0.998	0.997	0.996	0.994	0.989	0.982	0.973	0.961	0.948	0.933	0.898	0.858	0.769	0.584	0.425
1.00	0.10225	0.999	0.998	0.995	0.991	0.986	0.979	0.964	0.944	0.915	0.882	0.845	0.805	0.721	0.637	0.483	0.268	0.152
2.00	0.08544	0.998	0.994	0.986	0.974	0.961	0.944	0.904	0.857	0.790	0.720	0.650	0.581	0.459	0.358	0.220	0.091	0.044
4.00	0.06428	0.996	0.985	0.968	0.944	0.914	0.880	0.803	0.719	0.613	0.516	0.430	0.357	0.246	0.173	0.090	0.032	0.000
8.00	0.04297	0.993	0.974	0.943	0.903	0.855	0.802	0.689	0.578	0.455	0.355	0.277	0.217	0.136	0.089	0.043	0.000	0.000
16.00	0.02582	0.991	0.963	0.920	0.864	0.801	0.733	0.598	0.477	0.354	0.262	0.196	0.149	0.089	0.057	0.026	0.000	0.000
32.00	0.01435	0.988	0.954	0.902	0.836	0.763	0.687	0.541	0.417	0.299	0.216	0.158	0.118	0.069	0.043	0.020	0.000	0.000
64.00	0.00760	0.987	0.949	0.891	0.820	0.741	0.660	0.510	0.386	0.271	0.193	0.140	0.103	0.060	0.037	0.013	0.000	0.000
128.00	0.00391	0.986	0.946	0.885	0.810	0.728	0.646	0.493	0.370	0.258	0.182	0.131	0.096	0.055	0.034	0.005	0.000	0.000
256.00	0.00199	0.986	0.945	0.882	0.805	0.722	0.638	0.485	0.362	0.251	0.176	0.126	0.093	0.053	0.033	0.001	0.000	0.000
512.00	0.00100	0.985	0.944	0.880	0.803	0.719	0.634	0.480	0.358	0.247	0.173	0.124	0.091	0.052	0.032	0.000	0.000	0.000

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(f) Length to inlet width ratio, 8.00

(f-1) Wall half-angle, 0°

Axial distance from slot exit, $\frac{x}{L} - 1$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.24888	1.000	0.998	0.996	0.993	0.988	0.983	0.969	0.949	0.915	0.868	0.808	0.739	0.209	0.086	0.024	0.005	0.002
0.50	0.21073	0.998	0.992	0.981	0.967	0.948	0.926	0.870	0.804	0.381	0.221	0.137	0.089	0.042	0.023	0.009	0.002	0.001
1.00	0.15834	0.995	0.982	0.961	0.932	0.898	0.652	0.362	0.233	0.142	0.091	0.060	0.042	0.022	0.013	0.005	0.002	0.001
2.00	0.10939	0.994	0.976	0.822	0.554	0.411	0.321	0.208	0.139	0.087	0.057	0.039	0.027	0.015	0.009	0.004	0.001	0.000
4.00	0.07141	0.993	0.749	0.482	0.358	0.280	0.223	0.147	0.100	0.063	0.042	0.029	0.020	0.011	0.007	0.003	0.001	0.000
8.00	0.04398	0.865	0.522	0.361	0.275	0.217	0.175	0.116	0.079	0.050	0.033	0.023	0.016	0.009	0.005	0.002	0.001	0.000
16.00	0.02546	0.741	0.426	0.302	0.232	0.184	0.148	0.099	0.067	0.043	0.029	0.020	0.014	0.008	0.005	0.002	0.001	0.000
32.00	0.01396	0.670	0.379	0.271	0.209	0.166	0.134	0.090	0.061	0.039	0.026	0.018	0.013	0.007	0.004	0.002	0.001	0.000
64.00	0.00736	0.631	0.356	0.256	0.198	0.157	0.127	0.085	0.058	0.037	0.025	0.017	0.012	0.007	0.004	0.002	0.001	0.000
128.00	0.00379	0.610	0.344	0.248	0.191	0.152	0.123	0.082	0.056	0.036	0.024	0.016	0.012	0.006	0.004	0.002	0.000	0.000
256.00	0.00192	0.600	0.338	0.243	0.188	0.150	0.121	0.081	0.055	0.035	0.023	0.016	0.011	0.006	0.004	0.002	0.000	0.000
512.00	0.00097	0.594	0.335	0.241	0.187	0.149	0.120	0.080	0.055	0.035	0.023	0.016	0.011	0.006	0.004	0.002	0.000	0.000

(f-2) Wall half-angle, 5°

0.25	0.21572	1.000	1.000	0.999	0.999	0.998	0.998	0.996	0.993	0.989	0.984	0.978	0.971	0.952	0.926	0.824	0.041	0.007
0.50	0.20174	1.000	0.999	0.997	0.994	0.991	0.987	0.977	0.962	0.939	0.906	0.864	0.810	0.414	0.128	0.029	0.005	0.002
1.00	0.17381	0.998	0.994	0.986	0.974	0.960	0.942	0.896	0.839	0.695	0.291	0.166	0.103	0.046	0.024	0.009	0.002	0.001
2.00	0.13277	0.996	0.984	0.965	0.939	0.907	0.872	0.459	0.261	0.151	0.094	0.061	0.041	0.021	0.012	0.005	0.001	0.001
4.00	0.09144	0.994	0.976	0.948	0.813	0.507	0.361	0.218	0.142	0.087	0.056	0.038	0.026	0.014	0.008	0.004	0.001	0.000
8.00	0.05820	0.992	0.969	0.689	0.424	0.310	0.240	0.153	0.101	0.063	0.041	0.028	0.020	0.011	0.006	0.003	0.001	0.000
16.00	0.03447	0.990	0.794	0.456	0.320	0.243	0.191	0.123	0.083	0.052	0.034	0.023	0.016	0.009	0.005	0.002	0.001	0.000
32.00	0.01919	0.988	0.654	0.381	0.275	0.212	0.167	0.109	0.073	0.046	0.030	0.021	0.015	0.008	0.005	0.002	0.001	0.000
64.00	0.01021	0.979	0.578	0.347	0.254	0.196	0.155	0.101	0.068	0.043	0.028	0.019	0.014	0.007	0.004	0.002	0.001	0.000
128.00	0.00528	0.944	0.539	0.331	0.243	0.188	0.149	0.098	0.066	0.042	0.027	0.019	0.013	0.007	0.004	0.002	0.001	0.000
256.00	0.00269	0.926	0.519	0.323	0.238	0.184	0.146	0.096	0.064	0.041	0.027	0.018	0.013	0.007	0.004	0.002	0.001	0.000
512.00	0.00136	0.917	0.509	0.319	0.235	0.182	0.145	0.095	0.064	0.040	0.027	0.018	0.013	0.007	0.004	0.002	0.001	0.000

(f-3) Wall half-angle, 10°

0.25	0.17743	1.000	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.993	0.991	0.988	0.981	0.973	0.952	0.881	0.515
0.50	0.17025	1.000	1.000	0.999	0.998	0.997	0.996	0.992	0.987	0.980	0.971	0.960	0.947	0.913	0.864	0.690	0.016	0.004
1.00	0.15561	0.999	0.998	0.995	0.991	0.986	0.979	0.962	0.940	0.903	0.855	0.797	0.732	0.171	0.064	0.017	0.004	0.001
2.00	0.12934	0.998	0.991	0.981	0.966	0.947	0.924	0.868	0.803	0.463	0.195	0.111	0.069	0.032	0.017	0.006	0.002	0.001
4.00	0.09489	0.995	0.981	0.959	0.929	0.893	0.853	0.407	0.215	0.120	0.073	0.048	0.032	0.017	0.010	0.004	0.001	0.000
8.00	0.06251	0.993	0.972	0.940	0.898	0.607	0.356	0.196	0.123	0.074	0.047	0.032	0.022	0.012	0.007	0.003	0.001	0.000
16.00	0.03777	0.991	0.964	0.922	0.541	0.327	0.238	0.144	0.093	0.057	0.037	0.025	0.017	0.009	0.006	0.002	0.001	0.000
32.00	0.02127	0.989	0.956	0.695	0.375	0.262	0.197	0.122	0.080	0.049	0.032	0.022	0.015	0.008	0.005	0.002	0.001	0.000
64.00	0.01139	0.987	0.950	0.574	0.327	0.234	0.178	0.111	0.073	0.046	0.030	0.020	0.014	0.008	0.005	0.002	0.001	0.000
128.00	0.00591	0.986	0.929	0.513	0.305	0.221	0.169	0.106	0.070	0.044	0.029	0.019	0.014	0.007	0.004	0.002	0.001	0.000
256.00	0.00301	0.986	0.898	0.482	0.295	0.215	0.165	0.104	0.069	0.043	0.028	0.019	0.013	0.007	0.004	0.002	0.001	0.000
512.00	0.00152	0.985	0.882	0.466	0.290	0.212	0.163	0.103	0.068	0.042	0.028	0.019	0.013	0.007	0.004	0.002	0.001	0.000

(f-4) Wall half-angle, 20°

0.25	0.13412	1.000	1.000	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.996	0.995	0.993	0.989	0.984	0.973	0.939	0.894
0.50	0.13000	1.000	1.000	0.999	0.999	0.998	0.998	0.996	0.993	0.990	0.985	0.980	0.973	0.959	0.941	0.896	0.755	0.038
1.00	0.12207	1.000	0.999	0.998	0.996	0.994	0.991	0.984	0.975	0.960	0.943	0.922	0.898	0.838	0.757	0.149	0.007	0.002
2.00	0.10765	0.999	0.996	0.991	0.985	0.976	0.965	0.938	0.904	0.850	0.786	0.716	0.647	0.092	0.035	0.010	0.002	0.001
4.00	0.08522	0.997	0.988	0.974	0.954	0.929	0.900	0.831	0.754	0.524	0.147	0.078	0.047	0.021	0.011	0.004	0.001	0.000
8.00	0.05927	0.994	0.977	0.950	0.914	0.871	0.823	0.664	0.201	0.098	0.057	0.036	0.024	0.012	0.007	0.003	0.001	0.000
16.00	0.03690	0.991	0.967	0.927	0.877	0.819	0.660	0.201	0.111	0.063	0.039	0.025	0.017	0.009	0.005	0.002	0.001	0.000
32.00	0.02113	0.989	0.958	0.909	0.848	0.659	0.302	0.145	0.087	0.051	0.032	0.021	0.014	0.008	0.004	0.002	0.001	0.000
64.00	0.01142	0.987	0.951	0.896	0.827	0.458	0.239	0.125	0.077	0.045	0.029	0.019	0.013	0.007	0.004	0.002	0.001	0.000
128.00	0.00595	0.986	0.947	0.888	0.765	0.360	0.215	0.116	0.072	0.043	0.027	0.018	0.013	0.007	0.004	0.002	0.000	0.000
256.00	0.00304	0.986	0.945	0.884	0.710	0.316	0.205	0.112	0.070	0.042	0.026	0.018	0.012	0.007	0.004	0.002	0.000	0.000
512.00	0.00154	0.986	0.944	0.881	0.683	0.305	0.200	0.110	0.069	0.041	0.026	0.017	0.012	0.006	0.004	0.002	0.000	0.000

(f-5) Wall half-angle, 30°

0.25	0.10560	1.000	1.000	1.000	1.000	1.000	0.999	0.999	0.999	0.998	0.997	0.996	0.994	0.991	0.987	0.977	0.950	0.913
0.50	0.10258	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.992	0.988	0.983	0.978	0.967	0.952	0.918	0.827	0.717
1.00	0.09694	1.000	0.999	0.998	0.997	0.995	0.993	0.987	0.980	0.970	0.957	0.942	0.925	0.885	0.840	0.733	0.079	0.004
2.00	0.08705	0.999	0.997	0.994	0.989	0.983	0.976	0.958	0.935	0.901	0.860	0.814	0.762	0.649	0.537	0.022	0.003	0.001
4.00	0.07158	0.998	0.992	0.982	0.968	0.950	0.929	0.878	0.817	0.731	0.643	0.560	0.154	0.035	0.015	0.005	0.001	0.000
8.00	0.05197	0.995	0.981	0.959	0.928	0.891	0.849	0.755	0.658	0.463	0.092	0.046	0.027	0.012	0.006	0.002	0.001	0.000
16.00	0.03329	0.992	0.969	0.933	0.886	0.831	0.772	0.649	0.260	0.078	0.041	0.025	0.016	0.008	0.004	0.002	0.000	0.000
32.00	0.01937	0.990	0.959	0.912	0.853	0.785	0.714	0.398	0.107	0.052	0.030	0.019	0.013	0.006	0.004	0.001	0.000	0.000
64.00	0.01055	0.988	0.952	0.898	0.830	0.754	0.676	0.180	0.084	0.044	0.026	0.017	0.011	0.006	0.003	0.001	0.000	0.000
128.00	0.00553	0.987	0.948	0.889	0.816	0.736	0.655	0.151	0.076	0.041	0.024	0.016	0.011	0.005	0.003	0.001	0.000	0.000
256.00	0.00283	0.986	0.946	0.884	0.809	0.726	0.643	0.139	0.072	0.039	0.023	0.015	0.010	0.005	0.003	0.001	0.000	0.000
512.00	0.00143	0.986	0.944	0.881	0.805	0.721	0.604	0.134	0.070	0.038	0.023	0.015	0.010	0.005	0.003	0.001	0.000	0.000

(f-6) Wall half-angle, 45°

0.25	0.08157	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.996	0.995	0.992	0.988	0.979	0.953	0.920
0.50	0.07925	1.000	1.000	1.000	0.999	0.999	0.998	0.997	0.995	0.992	0.989	0.985	0.980	0.969	0.956	0.924	0.841	0.744
1.00	0.07498	1.000	0.999	0.998	0.997	0.995	0.993	0.988	0.982	0.972	0.960	0.947	0.931	0.896	0.856	0.765	0.576	0.406
2.00	0.06765	0.999	0.998	0.995	0.991	0.985	0.979	0.963	0.943	0.914	0.879	0.841	0.801	0.715	0.627	0.461	0.009	0.001
4.00	0.05648	0.998	0.993	0.985	0.974	0.959	0.942	0.901	0.851	0.782	0.708	0.632	0.559	0.428	0.325	0.007	0.001	0.000
8.00	0.04223	0.996	0.985	0.966	0.940	0.909	0.873	0.790	0.700	0.589	0.488	0.401	0.329	0.019	0.007	0.002	0.000	0.000
16.00	0.02785	0.993	0.972	0.940	0.896	0.846	0.790	0.672	0.558	0.434	0.336	0.041	0.019	0.007	0.003	0.001	0.000	0.000
32.00	0.01650	0.990	0.961	0.916	0.859	0.793	0.724	0.586	0.464	0.342	0.040	0.019	0.011	0.005	0.002	0.001	0.000	0.000
64.00	0.00908	0.988	0.953	0.900	0.833	0.759	0.682	0.535	0.411	0.083	0.027	0.014	0.009	0.004	0.002	0.001	0.000	0.000
128.00	0.00478	0.987	0.949	0.890	0.818	0.738	0.657	0.506	0.383	0.052	0.023	0.013	0.008	0.004	0.002	0.001	0.000	0.000
256.00	0.00246	0.986	0.946	0.885	0.809	0.727	0.644	0.492	0.368	0.046	0.021	0.012	0.007	0.003	0.002	0.001	0.000	0.000
512.00	0.00125	0.986	0.944	0.882	0.805	0.721	0.637	0.484	0.361	0.043	0.020	0.011	0.007	0.003	0.002	0.001	0.000	0.000

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(g) Length to inlet width ratio, 0.25

(g-1) Wall half-angle, -5°

Axial distance from slot exit, $\frac{x}{x - L}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.80497	0.999	0.997	0.993	0.987	0.980	0.970	0.945	0.910	0.850	0.769	0.668	0.531	0.277	0.139	0.042	0.007	0.003
0.50	0.62935	0.996	0.985	0.967	0.941	0.907	0.868	0.770	0.643	0.474	0.334	0.231	0.161	0.082	0.045	0.016	0.004	0.002
1.00	0.40463	0.991	0.966	0.925	0.872	0.798	0.718	0.559	0.420	0.287	0.196	0.135	0.095	0.050	0.028	0.010	0.003	0.001
2.00	0.22586	0.988	0.948	0.883	0.804	0.719	0.633	0.475	0.348	0.234	0.159	0.110	0.078	0.041	0.023	0.009	0.002	0.001
4.00	0.11810	0.980	0.929	0.859	0.776	0.689	0.602	0.446	0.325	0.218	0.148	0.102	0.072	0.038	0.022	0.008	0.002	0.001
8.00	0.05989	0.976	0.924	0.853	0.768	0.680	0.593	0.438	0.317	0.212	0.144	0.099	0.070	0.037	0.021	0.008	0.002	0.001
16.00	0.02999	0.980	0.927	0.854	0.769	0.680	0.592	0.436	0.316	0.211	0.143	0.099	0.070	0.037	0.021	0.008	0.002	0.001
32.00	0.01500	0.981	0.928	0.855	0.769	0.680	0.592	0.436	0.315	0.210	0.142	0.098	0.069	0.037	0.021	0.008	0.002	0.001
64.00	0.00750	0.982	0.929	0.855	0.770	0.680	0.592	0.436	0.315	0.210	0.142	0.098	0.069	0.037	0.021	0.008	0.002	0.001
128.00	0.00375	0.982	0.929	0.856	0.770	0.680	0.592	0.436	0.315	0.210	0.142	0.098	0.069	0.037	0.021	0.008	0.002	0.001
256.00	0.00187	0.983	0.929	0.856	0.770	0.680	0.592	0.436	0.315	0.210	0.142	0.098	0.069	0.037	0.021	0.008	0.002	0.001
512.00	0.00094	0.983	0.929	0.856	0.770	0.680	0.592	0.436	0.315	0.210	0.142	0.098	0.069	0.037	0.021	0.008	0.002	0.001

(g-2) Wall half-angle, -10°

0.25	0.80849	0.999	0.997	0.992	0.986	0.978	0.967	0.940	0.901	0.833	0.743	0.619	0.471	0.240	0.121	0.038	0.007	0.003
0.50	0.62530	0.996	0.984	0.964	0.936	0.900	0.858	0.747	0.609	0.444	0.311	0.216	0.151	0.078	0.043	0.016	0.004	0.002
1.00	0.39693	0.991	0.964	0.920	0.855	0.780	0.701	0.543	0.407	0.278	0.190	0.132	0.093	0.049	0.028	0.011	0.003	0.001
2.00	0.21987	0.982	0.937	0.872	0.794	0.709	0.624	0.469	0.344	0.232	0.158	0.110	0.078	0.042	0.024	0.009	0.003	0.001
4.00	0.11302	0.982	0.932	0.862	0.779	0.692	0.605	0.449	0.327	0.220	0.150	0.104	0.074	0.039	0.023	0.009	0.003	0.001
8.00	0.05678	0.985	0.936	0.864	0.779	0.690	0.602	0.445	0.324	0.217	0.147	0.102	0.072	0.039	0.022	0.009	0.003	0.001
16.00	0.02843	0.985	0.938	0.865	0.780	0.690	0.601	0.444	0.322	0.216	0.147	0.102	0.072	0.038	0.022	0.009	0.003	0.001
32.00	0.01422	0.985	0.939	0.866	0.780	0.690	0.601	0.444	0.322	0.216	0.146	0.101	0.072	0.038	0.022	0.009	0.003	0.001
64.00	0.00711	0.985	0.940	0.867	0.781	0.690	0.601	0.444	0.322	0.215	0.146	0.101	0.072	0.038	0.022	0.009	0.003	0.001
128.00	0.00355	0.985	0.940	0.867	0.781	0.690	0.601	0.444	0.322	0.215	0.146	0.101	0.072	0.038	0.022	0.009	0.003	0.001
256.00	0.00178	0.985	0.941	0.867	0.781	0.690	0.601	0.444	0.322	0.215	0.146	0.101	0.072	0.038	0.022	0.009	0.003	0.001
512.00	0.00089	0.985	0.941	0.867	0.781	0.690	0.601	0.444	0.322	0.215	0.146	0.101	0.072	0.038	0.022	0.009	0.003	0.001

(g-3) Wall half-angle, -20°

0.25	0.80817	0.999	0.996	0.990	0.982	0.972	0.959	0.924	0.874	0.789	0.659	0.511	0.374	0.187	0.097	0.033	0.007	0.003
0.50	0.60929	0.995	0.981	0.958	0.925	0.881	0.825	0.694	0.555	0.398	0.277	0.192	0.135	0.071	0.040	0.015	0.004	0.002
1.00	0.37688	0.987	0.950	0.897	0.830	0.754	0.675	0.520	0.389	0.266	0.182	0.127	0.090	0.049	0.028	0.011	0.003	0.001
2.00	0.20082	0.986	0.944	0.878	0.799	0.714	0.628	0.471	0.346	0.235	0.161	0.112	0.080	0.043	0.025	0.010	0.003	0.001
4.00	0.10197	0.985	0.944	0.878	0.794	0.706	0.618	0.460	0.336	0.227	0.155	0.108	0.077	0.042	0.024	0.010	0.003	0.001
8.00	0.05118	0.985	0.943	0.879	0.795	0.705	0.616	0.457	0.334	0.225	0.153	0.107	0.076	0.041	0.024	0.010	0.003	0.001
16.00	0.02562	0.985	0.943	0.879	0.796	0.705	0.616	0.457	0.333	0.224	0.153	0.107	0.076	0.041	0.024	0.010	0.003	0.001
32.00	0.01281	0.985	0.943	0.879	0.797	0.706	0.616	0.457	0.333	0.224	0.153	0.106	0.076	0.041	0.024	0.010	0.003	0.001
64.00	0.00641	0.985	0.943	0.879	0.797	0.706	0.616	0.457	0.332	0.224	0.153	0.106	0.076	0.041	0.024	0.010	0.003	0.001
128.00	0.00320	0.985	0.943	0.879	0.797	0.706	0.616	0.457	0.332	0.224	0.153	0.106	0.076	0.041	0.024	0.010	0.003	0.001
256.00	0.00160	0.985	0.943	0.879	0.797	0.706	0.616	0.457	0.332	0.224	0.153	0.106	0.076	0.041	0.024	0.010	0.003	0.001
512.00	0.00080	0.985	0.943	0.879	0.797	0.706	0.616	0.457	0.332	0.224	0.153	0.106	0.076	0.041	0.024	0.010	0.003	0.001

(g-4) Wall half-angle, -30°

0.25	0.79314	0.998	0.994	0.986	0.975	0.960	0.942	0.892	0.814	0.684	0.536	0.394	0.280	0.141	0.076	0.028	0.007	0.003
0.50	0.57356	0.994	0.973	0.940	0.894	0.839	0.776	0.636	0.498	0.351	0.244	0.170	0.121	0.065	0.037	0.015	0.004	0.002
1.00	0.33454	0.988	0.954	0.898	0.827	0.749	0.667	0.511	0.381	0.260	0.180	0.126	0.090	0.049	0.029	0.012	0.004	0.002
2.00	0.17477	0.986	0.946	0.885	0.809	0.723	0.636	0.478	0.352	0.239	0.165	0.116	0.083	0.046	0.027	0.011	0.003	0.001
4.00	0.08840	0.985	0.944	0.880	0.803	0.718	0.629	0.470	0.344	0.234	0.161	0.113	0.081	0.044	0.026	0.011	0.003	0.001
8.00	0.04433	0.985	0.943	0.879	0.801	0.716	0.628	0.468	0.343	0.232	0.159	0.112	0.080	0.044	0.026	0.011	0.003	0.001
16.00	0.02218	0.985	0.943	0.879	0.801	0.716	0.629	0.468	0.342	0.232	0.159	0.112	0.080	0.044	0.026	0.011	0.003	0.001
32.00	0.01109	0.985	0.943	0.879	0.800	0.716	0.629	0.468	0.342	0.232	0.159	0.111	0.080	0.044	0.026	0.011	0.003	0.001
64.00	0.00555	0.985	0.943	0.879	0.800	0.716	0.629	0.468	0.342	0.232	0.159	0.111	0.080	0.044	0.026	0.011	0.003	0.001
128.00	0.00277	0.985	0.943	0.879	0.800	0.716	0.629	0.468	0.342	0.231	0.159	0.111	0.080	0.044	0.026	0.011	0.003	0.001
256.00	0.00139	0.985	0.943	0.879	0.800	0.716	0.629	0.468	0.342	0.231	0.159	0.111	0.080	0.044	0.026	0.011	0.003	0.001
512.00	0.00069	0.985	0.943	0.879	0.800	0.716	0.630	0.468	0.342	0.231	0.159	0.111	0.080	0.044	0.026	0.011	0.003	0.001

(g-5) Wall half-angle, -45°

0.25	0.70711	0.995	0.983	0.963	0.936	0.901	0.858	0.752	0.628	0.470	0.336	0.236	0.167	0.088	0.051	0.020	0.006	0.002
0.50	0.44721	0.990	0.962	0.918	0.859	0.791	0.715	0.562	0.426	0.296	0.205	0.144	0.104	0.057	0.034	0.015	0.004	0.002
1.00	0.24254	0.987	0.949	0.891	0.818	0.737	0.654	0.499	0.370	0.254	0.176	0.124	0.090	0.050	0.030	0.013	0.004	0.002
2.00	0.12403	0.986	0.944	0.882	0.805	0.721	0.637	0.482	0.357	0.244	0.169	0.119	0.086	0.048	0.029	0.013	0.004	0.002
4.00	0.06238	0.985	0.943	0.880	0.802	0.717	0.632	0.478	0.354	0.241	0.167	0.118	0.085	0.048	0.029	0.013	0.004	0.002
8.00	0.03123	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.353	0.241	0.167	0.118	0.085	0.047	0.028	0.013	0.004	0.002
16.00	0.01562	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.353	0.241	0.166	0.118	0.085	0.047	0.028	0.013	0.004	0.002
32.00	0.00781	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.353	0.241	0.166	0.118	0.085	0.047	0.028	0.013	0.004	0.002
64.00	0.00391	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.353	0.241	0.166	0.118	0.085	0.047	0.028	0.013	0.004	0.002
128.00	0.00195	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.241	0.166	0.118	0.085	0.047	0.028	0.013	0.004	0.002
256.00	0.00098	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.241	0.166	0.118	0.085	0.047	0.028	0.013	0.004	0.002
512.00	0.00049	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.241	0.166	0.118	0.085	0.047	0.028	0.013	0.004	0.002

(g-6) Wall half-angle, -60°

0.25	0.28735	0.987	0.951	0.895	0.825	0.746	0.664	0.509	0.381	0.264	0.184	0.131	0.095	0.054	0.033	0.014	0.004	0.002
0.50	0.14834	0.986	0.945	0.883	0.807	0.723	0.639	0.485	0.361	0.249	0.174	0.124	0.090	0.051	0.031	0.014	0.004	0.002
1.00	0.07479	0.985	0.943	0.880	0.802	0.718	0.633	0.478	0.355	0.245	0.172	0.122	0.089	0.050	0.031	0.014	0.004	0.002
2.00	0.03747	0.985	0.943	0.879	0.801	0.716	0.631	0.477	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
4.00	0.01875	0.985	0.943	0.879	0.801	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
8.00	0.00937	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
16.00	0.00469	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
32.00	0.00234	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
64.00	0.00117	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
128.00	0.00059	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
256.00	0.00029	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002
512.00	0.00015	0.985	0.943	0.879	0.800	0.716	0.631	0.476	0.354	0.244	0.171	0.122	0.089	0.050	0.031	0.014	0.004	0.002

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(h) Length to inlet width ratio, 0.50

(h-1) Wall half-angle, -5°

Axial distance from slot exit, $\frac{x}{L} - 1$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.73002	0.999	0.997	0.993	0.987	0.979	0.969	0.943	0.907	0.846	0.764	0.664	0.504	0.247	0.116	0.029	0.007	0.003
0.50	0.57057	0.996	0.985	0.967	0.942	0.909	0.870	0.776	0.636	0.458	0.314	0.211	0.142	0.065	0.033	0.013	0.004	0.001
1.00	0.37105	0.992	0.968	0.929	0.875	0.795	0.710	0.544	0.400	0.265	0.174	0.115	0.077	0.037	0.021	0.009	0.003	0.001
2.00	0.21137	0.989	0.945	0.872	0.788	0.698	0.608	0.447	0.319	0.207	0.134	0.088	0.058	0.030	0.018	0.008	0.002	0.001
4.00	0.11252	0.972	0.913	0.835	0.746	0.655	0.566	0.409	0.289	0.185	0.120	0.078	0.052	0.028	0.017	0.007	0.002	0.001
8.00	0.05741	0.968	0.906	0.826	0.735	0.642	0.552	0.397	0.279	0.178	0.114	0.074	0.049	0.027	0.016	0.007	0.002	0.001
16.00	0.02874	0.974	0.910	0.828	0.736	0.642	0.551	0.394	0.276	0.176	0.113	0.073	0.049	0.027	0.016	0.007	0.002	0.001
32.00	0.01437	0.977	0.913	0.830	0.737	0.642	0.551	0.393	0.275	0.175	0.112	0.073	0.049	0.027	0.016	0.007	0.002	0.001
64.00	0.00719	0.979	0.914	0.831	0.738	0.642	0.551	0.393	0.275	0.175	0.112	0.073	0.049	0.027	0.016	0.007	0.002	0.001
128.00	0.00359	0.980	0.915	0.831	0.738	0.642	0.551	0.393	0.275	0.175	0.112	0.073	0.049	0.027	0.016	0.007	0.002	0.001
256.00	0.00180	0.980	0.915	0.831	0.738	0.642	0.551	0.393	0.275	0.175	0.112	0.073	0.049	0.027	0.016	0.007	0.002	0.001
512.00	0.00090	0.980	0.915	0.832	0.738	0.642	0.551	0.393	0.274	0.174	0.112	0.073	0.049	0.027	0.016	0.007	0.002	0.001

(h-2) Wall half-angle, -10°

0.25	0.73459	0.999	0.996	0.991	0.983	0.973	0.960	0.927	0.880	0.801	0.693	0.532	0.384	0.182	0.086	0.026	0.006	0.002
0.50	0.55911	0.996	0.983	0.961	0.931	0.893	0.849	0.716	0.567	0.399	0.271	0.182	0.123	0.058	0.031	0.013	0.004	0.001
1.00	0.35430	0.991	0.965	0.911	0.839	0.758	0.674	0.512	0.375	0.248	0.164	0.109	0.073	0.037	0.022	0.009	0.003	0.001
2.00	0.19898	0.974	0.920	0.848	0.765	0.677	0.589	0.433	0.310	0.201	0.132	0.087	0.058	0.032	0.019	0.008	0.002	0.001
4.00	0.10197	0.981	0.921	0.843	0.754	0.662	0.572	0.414	0.294	0.190	0.123	0.081	0.055	0.030	0.018	0.008	0.002	0.001
8.00	0.05118	0.985	0.929	0.847	0.755	0.661	0.569	0.410	0.289	0.186	0.120	0.079	0.055	0.030	0.018	0.008	0.002	0.001
16.00	0.02562	0.985	0.933	0.850	0.757	0.661	0.569	0.408	0.287	0.184	0.119	0.078	0.054	0.030	0.018	0.008	0.002	0.001
32.00	0.01281	0.985	0.936	0.852	0.758	0.662	0.569	0.408	0.287	0.184	0.119	0.078	0.054	0.030	0.018	0.008	0.002	0.001
64.00	0.00641	0.985	0.937	0.853	0.759	0.662	0.569	0.408	0.286	0.183	0.118	0.078	0.054	0.030	0.018	0.008	0.002	0.001
128.00	0.00320	0.985	0.938	0.854	0.759	0.662	0.569	0.407	0.286	0.183	0.118	0.078	0.054	0.030	0.018	0.008	0.002	0.001
256.00	0.00160	0.985	0.938	0.854	0.759	0.662	0.569	0.407	0.286	0.183	0.118	0.077	0.054	0.030	0.018	0.008	0.002	0.001
512.00	0.00080	0.985	0.938	0.854	0.759	0.662	0.569	0.407	0.286	0.183	0.118	0.077	0.054	0.030	0.018	0.008	0.002	0.001

(h-3) Wall half-angle, -20°

0.25	0.71861	0.998	0.993	0.983	0.970	0.952	0.930	0.871	0.784	0.630	0.470	0.333	0.229	0.109	0.055	0.021	0.006	0.002
0.50	0.51191	0.994	0.976	0.944	0.890	0.827	0.756	0.606	0.463	0.318	0.214	0.145	0.099	0.050	0.029	0.012	0.004	0.002
1.00	0.30478	0.980	0.934	0.871	0.795	0.713	0.629	0.472	0.344	0.228	0.152	0.102	0.070	0.038	0.023	0.010	0.003	0.001
2.00	0.15799	0.986	0.945	0.870	0.784	0.692	0.603	0.443	0.318	0.208	0.138	0.092	0.065	0.036	0.022	0.009	0.003	0.001
4.00	0.07975	0.985	0.944	0.877	0.785	0.690	0.597	0.435	0.310	0.202	0.133	0.089	0.064	0.035	0.021	0.009	0.003	0.001
8.00	0.03997	0.985	0.943	0.879	0.788	0.691	0.597	0.433	0.307	0.200	0.131	0.088	0.063	0.035	0.021	0.009	0.003	0.001
16.00	0.02000	0.985	0.943	0.879	0.791	0.693	0.598	0.432	0.306	0.199	0.130	0.088	0.063	0.035	0.021	0.009	0.003	0.001
32.00	0.01000	0.985	0.943	0.879	0.792	0.693	0.598	0.432	0.306	0.198	0.130	0.088	0.063	0.035	0.021	0.009	0.003	0.001
64.00	0.00500	0.985	0.943	0.879	0.793	0.694	0.598	0.432	0.306	0.198	0.130	0.088	0.063	0.035	0.021	0.009	0.003	0.001
128.00	0.00250	0.985	0.943	0.879	0.793	0.694	0.598	0.432	0.306	0.198	0.130	0.088	0.063	0.035	0.021	0.009	0.003	0.001
256.00	0.00125	0.985	0.943	0.879	0.793	0.694	0.598	0.432	0.306	0.198	0.129	0.088	0.063	0.035	0.021	0.009	0.003	0.001
512.00	0.00062	0.985	0.943	0.879	0.794	0.694	0.598	0.432	0.306	0.198	0.129	0.088	0.063	0.035	0.021	0.009	0.003	0.001

(h-4) Wall half-angle, -30°

0.25	0.62606	0.996	0.983	0.958	0.921	0.873	0.818	0.689	0.551	0.394	0.273	0.187	0.130	0.066	0.038	0.016	0.005	0.002
0.50	0.38723	0.989	0.955	0.899	0.831	0.754	0.673	0.517	0.383	0.259	0.175	0.120	0.084	0.046	0.028	0.012	0.004	0.002
1.00	0.20552	0.986	0.947	0.887	0.810	0.721	0.632	0.470	0.341	0.227	0.152	0.105	0.075	0.042	0.025	0.011	0.003	0.001
2.00	0.10443	0.986	0.944	0.881	0.804	0.717	0.624	0.459	0.330	0.218	0.146	0.101	0.073	0.041	0.025	0.011	0.003	0.001
4.00	0.05243	0.985	0.943	0.879	0.801	0.717	0.624	0.456	0.327	0.215	0.144	0.100	0.072	0.040	0.024	0.011	0.003	0.001
8.00	0.02624	0.985	0.943	0.879	0.801	0.716	0.626	0.456	0.326	0.214	0.143	0.100	0.072	0.040	0.024	0.011	0.003	0.001
16.00	0.01312	0.985	0.943	0.879	0.800	0.716	0.627	0.456	0.326	0.214	0.143	0.100	0.072	0.040	0.024	0.011	0.003	0.001
32.00	0.00656	0.985	0.943	0.879	0.800	0.716	0.627	0.456	0.326	0.213	0.143	0.100	0.072	0.040	0.024	0.011	0.003	0.001
64.00	0.00328	0.985	0.943	0.879	0.800	0.716	0.628	0.456	0.326	0.213	0.143	0.100	0.072	0.040	0.024	0.011	0.003	0.001
128.00	0.00164	0.985	0.943	0.879	0.800	0.716	0.628	0.457	0.326	0.213	0.143	0.100	0.072	0.040	0.024	0.011	0.003	0.001
256.00	0.00082	0.985	0.943	0.879	0.800	0.716	0.628	0.457	0.326	0.213	0.143	0.100	0.072	0.040	0.024	0.011	0.003	0.001
512.00	0.00041	0.985	0.943	0.879	0.800	0.716	0.628	0.457	0.326	0.213	0.143	0.100	0.072	0.040	0.024	0.011	0.003	0.001

(1) Length to inlet width ratio, 1.00

(1-1) Wall half-angle, -5°

Axial distance from slot exit, $\frac{\bar{x}}{\bar{x} - \bar{L}}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.62451	0.999	0.996	0.992	0.985	0.976	0.965	0.936	0.895	0.826	0.738	0.586	0.410	0.167	0.075	0.024	0.006	0.002
0.50	0.48533	0.996	0.985	0.966	0.940	0.907	0.868	0.762	0.592	0.400	0.254	0.153	0.101	0.050	0.028	0.011	0.003	0.001
1.00	0.31894	0.992	0.969	0.933	0.864	0.771	0.676	0.495	0.344	0.206	0.129	0.086	0.060	0.032	0.019	0.008	0.002	0.001
2.00	0.18672	0.990	0.931	0.843	0.746	0.646	0.549	0.380	0.250	0.151	0.099	0.068	0.048	0.026	0.015	0.007	0.002	0.001
4.00	0.10223	0.955	0.877	0.784	0.683	0.583	0.488	0.328	0.210	0.133	0.088	0.060	0.043	0.023	0.014	0.006	0.002	0.001
8.00	0.05243	0.953	0.870	0.772	0.668	0.565	0.469	0.310	0.199	0.127	0.084	0.058	0.041	0.022	0.013	0.006	0.002	0.001
16.00	0.02624	0.963	0.877	0.775	0.668	0.563	0.466	0.305	0.197	0.126	0.084	0.058	0.041	0.022	0.013	0.006	0.002	0.001
32.00	0.01312	0.969	0.881	0.777	0.668	0.562	0.464	0.303	0.196	0.126	0.084	0.057	0.041	0.022	0.013	0.006	0.002	0.001
64.00	0.00656	0.972	0.883	0.778	0.669	0.562	0.463	0.301	0.196	0.126	0.083	0.057	0.041	0.022	0.013	0.006	0.002	0.001
128.00	0.00328	0.974	0.884	0.779	0.669	0.562	0.463	0.301	0.196	0.125	0.083	0.057	0.041	0.022	0.013	0.006	0.002	0.001
256.00	0.00164	0.974	0.884	0.779	0.669	0.561	0.463	0.301	0.195	0.125	0.083	0.057	0.041	0.022	0.013	0.006	0.002	0.001
512.00	0.00082	0.975	0.885	0.779	0.669	0.561	0.462	0.300	0.195	0.125	0.083	0.057	0.041	0.022	0.013	0.006	0.002	0.001

(1-2) Wall half-angle, -10°

0.25	0.61772	0.998	0.993	0.984	0.972	0.956	0.935	0.882	0.811	0.662	0.480	0.323	0.207	0.092	0.048	0.018	0.005	0.002
0.50	0.44936	0.995	0.978	0.952	0.916	0.861	0.780	0.611	0.451	0.290	0.180	0.120	0.082	0.043	0.025	0.010	0.003	0.001
1.00	0.28081	0.991	0.945	0.869	0.782	0.690	0.597	0.428	0.292	0.181	0.119	0.081	0.057	0.031	0.018	0.008	0.002	0.001
2.00	0.15799	0.958	0.886	0.799	0.704	0.607	0.513	0.352	0.233	0.150	0.100	0.068	0.049	0.027	0.016	0.007	0.002	0.001
4.00	0.07975	0.985	0.904	0.806	0.702	0.598	0.500	0.335	0.225	0.145	0.097	0.067	0.047	0.026	0.016	0.007	0.002	0.001
8.00	0.03997	0.985	0.916	0.813	0.703	0.595	0.495	0.327	0.222	0.143	0.096	0.066	0.047	0.026	0.016	0.007	0.002	0.001
16.00	0.02000	0.985	0.924	0.818	0.705	0.595	0.492	0.323	0.220	0.142	0.095	0.066	0.047	0.026	0.016	0.007	0.002	0.001
32.00	0.01000	0.985	0.928	0.820	0.706	0.594	0.491	0.322	0.220	0.142	0.095	0.066	0.047	0.026	0.016	0.007	0.002	0.001
64.00	0.00500	0.985	0.931	0.821	0.706	0.594	0.491	0.321	0.220	0.142	0.095	0.066	0.047	0.026	0.015	0.007	0.002	0.001
128.00	0.00250	0.985	0.932	0.822	0.707	0.594	0.490	0.320	0.219	0.142	0.095	0.066	0.047	0.026	0.015	0.007	0.002	0.001
256.00	0.00125	0.985	0.932	0.822	0.707	0.594	0.490	0.320	0.219	0.142	0.095	0.066	0.047	0.026	0.015	0.007	0.002	0.001
512.00	0.00062	0.985	0.933	0.823	0.707	0.594	0.490	0.320	0.219	0.142	0.095	0.066	0.047	0.026	0.015	0.007	0.002	0.001

(1-3) Wall half-angle, -20°

0.25	0.45795	0.994	0.974	0.923	0.859	0.786	0.707	0.546	0.401	0.261	0.172	0.117	0.082	0.044	0.026	0.011	0.003	0.001
0.50	0.26963	0.983	0.924	0.850	0.764	0.674	0.584	0.420	0.294	0.192	0.128	0.088	0.063	0.034	0.021	0.009	0.003	0.001
1.00	0.13865	0.986	0.945	0.860	0.759	0.656	0.558	0.388	0.272	0.178	0.120	0.083	0.059	0.033	0.020	0.009	0.003	0.001
2.00	0.06983	0.985	0.943	0.876	0.765	0.654	0.549	0.379	0.266	0.174	0.117	0.081	0.058	0.032	0.019	0.009	0.003	0.001
4.00	0.03498	0.985	0.943	0.879	0.772	0.655	0.546	0.376	0.263	0.172	0.116	0.081	0.058	0.032	0.019	0.009	0.003	0.001
8.00	0.01750	0.985	0.943	0.879	0.776	0.656	0.544	0.375	0.262	0.172	0.116	0.081	0.058	0.032	0.019	0.008	0.003	0.001
16.00	0.00875	0.985	0.943	0.879	0.779	0.656	0.543	0.374	0.262	0.172	0.116	0.081	0.058	0.032	0.019	0.008	0.003	0.001
32.00	0.00437	0.985	0.943	0.879	0.780	0.657	0.543	0.374	0.262	0.172	0.116	0.081	0.058	0.032	0.019	0.008	0.003	0.001
64.00	0.00219	0.985	0.943	0.879	0.781	0.657	0.543	0.374	0.262	0.172	0.116	0.081	0.058	0.032	0.019	0.008	0.003	0.001
128.00	0.00109	0.985	0.943	0.879	0.781	0.657	0.543	0.374	0.262	0.172	0.116	0.081	0.058	0.032	0.019	0.008	0.003	0.001
256.00	0.00055	0.985	0.943	0.879	0.782	0.657	0.543	0.374	0.262	0.172	0.116	0.081	0.058	0.032	0.019	0.008	0.003	0.001
512.00	0.00027	0.985	0.943	0.879	0.782	0.657	0.543	0.374	0.262	0.172	0.116	0.081	0.058	0.032	0.019	0.008	0.003	0.001

TABLE I. - Continued. CALCULATED ANGULAR DISTRIBUTION OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(j) Length to inlet width ratio, 2.00

(j-1) Wall half-angle, -5°

Axial distance from slot exit, $\frac{}{x - L}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.49254	0.999	0.994	0.987	0.977	0.964	0.948	0.905	0.847	0.758	0.544	0.336	0.207	0.090	0.046	0.016	0.004	0.002
0.50	0.37201	0.995	0.982	0.960	0.930	0.894	0.851	0.642	0.442	0.262	0.165	0.108	0.074	0.038	0.022	0.009	0.003	0.001
1.00	0.24471	0.992	0.970	0.909	0.797	0.680	0.565	0.364	0.244	0.153	0.100	0.068	0.047	0.025	0.015	0.006	0.002	0.001
2.00	0.14770	0.983	0.878	0.760	0.637	0.517	0.407	0.270	0.184	0.117	0.077	0.053	0.037	0.020	0.012	0.005	0.002	0.001
4.00	0.08399	0.908	0.793	0.668	0.542	0.423	0.341	0.228	0.156	0.100	0.066	0.045	0.032	0.018	0.011	0.005	0.001	0.001
8.00	0.04246	0.926	0.797	0.659	0.523	0.408	0.331	0.222	0.152	0.098	0.065	0.045	0.032	0.017	0.010	0.005	0.001	0.001
16.00	0.02125	0.943	0.804	0.658	0.515	0.404	0.328	0.220	0.151	0.097	0.065	0.044	0.032	0.017	0.010	0.005	0.001	0.001
32.00	0.01062	0.952	0.808	0.657	0.511	0.402	0.326	0.219	0.150	0.097	0.064	0.044	0.032	0.017	0.010	0.005	0.001	0.001
64.00	0.00531	0.957	0.810	0.657	0.508	0.401	0.326	0.219	0.150	0.097	0.064	0.044	0.032	0.017	0.010	0.005	0.001	0.001
128.00	0.00266	0.960	0.812	0.656	0.507	0.401	0.325	0.219	0.150	0.097	0.064	0.044	0.032	0.017	0.010	0.005	0.001	0.001
256.00	0.00133	0.961	0.812	0.656	0.506	0.401	0.325	0.219	0.150	0.097	0.064	0.044	0.032	0.017	0.010	0.005	0.001	0.001
512.00	0.00066	0.962	0.812	0.656	0.506	0.400	0.325	0.219	0.150	0.096	0.064	0.044	0.032	0.017	0.010	0.005	0.001	0.001

(j-2) Wall half-angle, -10°

0.25	0.37897	0.994	0.978	0.951	0.905	0.814	0.716	0.519	0.356	0.225	0.146	0.098	0.068	0.036	0.021	0.009	0.003	0.001
0.50	0.24323	0.992	0.910	0.813	0.707	0.598	0.493	0.336	0.232	0.149	0.098	0.067	0.048	0.026	0.015	0.007	0.002	0.001
1.00	0.13865	0.944	0.840	0.724	0.604	0.492	0.405	0.277	0.191	0.123	0.082	0.057	0.040	0.022	0.013	0.006	0.002	0.001
2.00	0.06983	0.985	0.864	0.723	0.583	0.477	0.392	0.268	0.186	0.120	0.080	0.056	0.040	0.022	0.013	0.006	0.002	0.001
4.00	0.03498	0.985	0.883	0.722	0.576	0.471	0.387	0.265	0.184	0.119	0.080	0.055	0.039	0.022	0.013	0.006	0.002	0.001
8.00	0.01750	0.985	0.897	0.721	0.574	0.468	0.385	0.264	0.183	0.119	0.079	0.055	0.039	0.022	0.013	0.006	0.002	0.001
16.00	0.00875	0.985	0.905	0.721	0.572	0.467	0.384	0.263	0.182	0.118	0.079	0.055	0.039	0.022	0.013	0.006	0.002	0.001
32.00	0.00437	0.985	0.910	0.720	0.572	0.467	0.384	0.263	0.182	0.118	0.079	0.055	0.039	0.022	0.013	0.006	0.002	0.001
64.00	0.00219	0.985	0.912	0.720	0.572	0.467	0.384	0.263	0.182	0.118	0.079	0.055	0.039	0.022	0.013	0.006	0.002	0.001
128.00	0.00109	0.985	0.913	0.720	0.572	0.466	0.384	0.262	0.182	0.118	0.079	0.055	0.039	0.022	0.013	0.006	0.002	0.001
256.00	0.00055	0.985	0.914	0.720	0.572	0.466	0.384	0.262	0.182	0.118	0.079	0.055	0.039	0.022	0.013	0.006	0.002	0.001
512.00	0.00027	0.985	0.914	0.720	0.571	0.466	0.384	0.262	0.182	0.118	0.079	0.055	0.039	0.022	0.013	0.006	0.002	0.001

TABLE I. - Concluded. CALCULATED ANGULAR DISTRIBUTION OF PARTICLE FLUX AT VARIOUS AXIAL DISTANCES FROM SLOT EXIT

(k) Length to inlet width ratio, 4.00; wall half-angle, -5°

Axial distance from slot exit, $\frac{x}{x} - \frac{L}{L}$	Centerplane flux relative to inlet flux, $n(0)/n_1$	Distance from centerplane, $\frac{y}{x - L}$																
		.1	.2	.3	.4	.5	.6	.8	1.	1.25	1.5	1.75	2.	2.5	3.	4.	6.	8.
		Flux relative to centerplane, $\frac{n[y/(x - L)]}{n(0)}$																
0.25	0.31449	0.996	0.985	0.966	0.941	0.909	0.872	0.645	0.415	0.252	0.159	0.104	0.071	0.036	0.021	0.008	0.002	0.001
0.50	0.21760	0.994	0.975	0.924	0.776	0.624	0.492	0.323	0.218	0.138	0.090	0.061	0.043	0.023	0.013	0.006	0.002	0.001
1.00	0.14070	0.992	0.836	0.670	0.517	0.412	0.334	0.223	0.152	0.097	0.064	0.044	0.031	0.017	0.010	0.004	0.001	0.001
2.00	0.08694	0.850	0.670	0.501	0.394	0.317	0.258	0.173	0.119	0.076	0.051	0.035	0.025	0.014	0.008	0.004	0.001	0.000
4.00	0.04495	0.858	0.634	0.471	0.372	0.300	0.244	0.165	0.113	0.073	0.049	0.033	0.024	0.013	0.008	0.003	0.001	0.000
8.00	0.02249	0.884	0.621	0.465	0.368	0.297	0.242	0.164	0.112	0.072	0.048	0.033	0.024	0.013	0.008	0.003	0.001	0.000
16.00	0.01125	0.901	0.617	0.462	0.366	0.296	0.241	0.163	0.112	0.072	0.048	0.033	0.024	0.013	0.008	0.003	0.001	0.000
32.00	0.00562	0.912	0.616	0.461	0.365	0.295	0.241	0.163	0.112	0.072	0.048	0.033	0.024	0.013	0.008	0.003	0.001	0.000
64.00	0.00281	0.917	0.615	0.461	0.365	0.295	0.240	0.162	0.112	0.072	0.048	0.033	0.024	0.013	0.008	0.003	0.001	0.000
128.00	0.00141	0.920	0.615	0.460	0.364	0.294	0.240	0.162	0.112	0.072	0.048	0.033	0.024	0.013	0.008	0.003	0.001	0.000
256.00	0.00070	0.922	0.614	0.460	0.364	0.294	0.240	0.162	0.112	0.072	0.048	0.033	0.024	0.013	0.008	0.003	0.001	0.000
512.00	0.00035	0.922	0.614	0.460	0.364	0.294	0.240	0.162	0.112	0.072	0.048	0.033	0.024	0.013	0.008	0.003	0.001	0.000

TABLE II. - CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(a) Length to inlet width ratio, 0.25

(a-1) Wall half-angle, 0°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.50	0.63040	1.007	1.011	1.011	1.009	1.003	0.994	0.982	0.967	0.949	0.929	0.906	0.881	0.854	0.825	0.795	0.764	0.731
1.00	0.40904	1.001	0.997	0.988	0.975	0.957	0.937	0.901	0.860	0.811	0.754	0.688	0.611	0.522	0.421	0.306	0.178	0.068
2.00	0.22968	0.998	0.989	0.974	0.943	0.907	0.863	0.813	0.757	0.694	0.625	0.550	0.468	0.381	0.290	0.194	0.100	0.047
4.00	0.12043	0.997	0.981	0.953	0.918	0.877	0.829	0.775	0.715	0.650	0.578	0.503	0.422	0.338	0.251	0.161	0.089	0.043
8.00	0.06144	0.993	0.972	0.943	0.907	0.864	0.815	0.760	0.699	0.632	0.561	0.485	0.405	0.322	0.236	0.149	0.086	0.041
16.00	0.03099	0.989	0.967	0.938	0.902	0.859	0.809	0.753	0.692	0.625	0.553	0.478	0.398	0.315	0.230	0.143	0.085	0.041
32.00	0.01556	0.987	0.965	0.936	0.899	0.856	0.806	0.750	0.689	0.622	0.550	0.474	0.395	0.312	0.227	0.141	0.084	0.040
64.00	0.00780	0.986	0.964	0.935	0.898	0.855	0.805	0.749	0.687	0.620	0.549	0.473	0.393	0.311	0.226	0.139	0.084	0.040
128.00	0.00390	0.986	0.964	0.934	0.898	0.854	0.804	0.748	0.686	0.619	0.548	0.472	0.392	0.310	0.225	0.139	0.084	0.040
256.00	0.00195	0.986	0.963	0.934	0.897	0.854	0.804	0.748	0.686	0.619	0.547	0.472	0.392	0.310	0.225	0.138	0.084	0.040
512.00	0.00098	0.985	0.963	0.934	0.897	0.854	0.804	0.748	0.686	0.619	0.547	0.471	0.392	0.310	0.225	0.138	0.084	0.040

(a-2) Wall half-angle, 5°

0.52	0.61805	1.007	1.011	1.011	1.009	1.003	0.994	0.983	0.968	0.951	0.931	0.908	0.883	0.856	0.827	0.797	0.766	0.733
1.00	0.41202	1.001	0.998	0.990	0.977	0.960	0.939	0.916	0.877	0.829	0.773	0.707	0.630	0.541	0.437	0.318	0.185	0.066
2.00	0.23264	0.998	0.990	0.975	0.955	0.918	0.875	0.824	0.767	0.704	0.634	0.557	0.474	0.385	0.291	0.193	0.094	0.044
4.00	0.12232	0.997	0.987	0.963	0.928	0.886	0.837	0.782	0.721	0.654	0.582	0.505	0.423	0.338	0.249	0.158	0.083	0.040
8.00	0.06248	0.996	0.982	0.952	0.915	0.872	0.822	0.765	0.703	0.635	0.563	0.485	0.404	0.320	0.233	0.144	0.080	0.038
16.00	0.03154	0.996	0.977	0.947	0.909	0.865	0.815	0.758	0.695	0.627	0.554	0.477	0.396	0.312	0.226	0.138	0.079	0.038
32.00	0.01584	0.996	0.974	0.944	0.907	0.862	0.811	0.754	0.691	0.623	0.551	0.473	0.393	0.309	0.223	0.135	0.078	0.037
64.00	0.00794	0.996	0.973	0.943	0.905	0.861	0.810	0.753	0.690	0.622	0.549	0.472	0.391	0.307	0.221	0.134	0.078	0.037
128.00	0.00397	0.996	0.973	0.942	0.905	0.860	0.809	0.752	0.689	0.621	0.548	0.471	0.390	0.307	0.221	0.133	0.078	0.037
256.00	0.00199	0.995	0.972	0.942	0.904	0.860	0.809	0.752	0.689	0.620	0.548	0.470	0.390	0.306	0.220	0.133	0.078	0.037
512.00	0.00099	0.995	0.972	0.942	0.904	0.860	0.809	0.751	0.688	0.620	0.547	0.470	0.390	0.306	0.220	0.132	0.078	0.037

(a-3) Wall half-angle, 10°

0.54	0.60189	1.007	1.010	1.011	1.008	1.003	0.994	0.983	0.968	0.951	0.931	0.909	0.884	0.856	0.827	0.796	0.764	0.731
1.00	0.41395	1.002	0.999	0.991	0.979	0.963	0.942	0.919	0.892	0.854	0.799	0.734	0.657	0.567	0.460	0.337	0.197	0.063
2.00	0.23523	0.998	0.990	0.976	0.957	0.933	0.891	0.840	0.782	0.718	0.646	0.568	0.483	0.392	0.295	0.194	0.089	0.041
4.00	0.12408	0.997	0.987	0.970	0.942	0.899	0.849	0.793	0.731	0.662	0.589	0.510	0.426	0.338	0.248	0.154	0.076	0.036
8.00	0.06348	0.996	0.985	0.966	0.928	0.883	0.831	0.774	0.710	0.641	0.566	0.487	0.405	0.318	0.230	0.139	0.073	0.034
16.00	0.03207	0.996	0.985	0.959	0.921	0.876	0.823	0.765	0.701	0.631	0.557	0.478	0.396	0.310	0.222	0.132	0.071	0.034
32.00	0.01611	0.996	0.985	0.957	0.918	0.872	0.820	0.761	0.697	0.627	0.553	0.474	0.391	0.306	0.218	0.129	0.071	0.034
64.00	0.00808	0.996	0.985	0.955	0.916	0.870	0.818	0.759	0.695	0.625	0.551	0.472	0.390	0.304	0.217	0.127	0.071	0.034
128.00	0.00404	0.996	0.985	0.954	0.915	0.870	0.817	0.758	0.694	0.624	0.550	0.471	0.389	0.303	0.216	0.126	0.070	0.033
256.00	0.00202	0.996	0.985	0.954	0.915	0.869	0.817	0.758	0.693	0.624	0.549	0.470	0.388	0.303	0.215	0.126	0.070	0.033
512.00	0.00101	0.996	0.985	0.954	0.915	0.869	0.816	0.758	0.693	0.623	0.549	0.470	0.388	0.303	0.215	0.126	0.070	0.033

(a-4) Wall half-angle, 20°

0.59	0.57202	1.006	1.009	1.009	1.006	1.001	0.992	0.980	0.966	0.949	0.928	0.905	0.880	0.852	0.821	0.788	0.752	0.714
1.00	0.41360	1.002	1.000	0.993	0.982	0.967	0.947	0.924	0.897	0.866	0.834	0.790	0.714	0.623	0.513	0.381	0.225	0.058
2.00	0.23733	0.999	0.991	0.977	0.958	0.933	0.904	0.871	0.816	0.749	0.675	0.594	0.505	0.409	0.306	0.199	0.087	0.034
4.00	0.12584	0.997	0.987	0.970	0.947	0.918	0.877	0.818	0.754	0.682	0.605	0.523	0.435	0.344	0.248	0.150	0.064	0.030
8.00	0.06454	0.996	0.985	0.967	0.943	0.909	0.855	0.794	0.728	0.655	0.578	0.495	0.409	0.319	0.227	0.132	0.060	0.028
16.00	0.03265	0.996	0.985	0.966	0.941	0.899	0.845	0.783	0.716	0.644	0.566	0.484	0.398	0.309	0.217	0.124	0.059	0.028
32.00	0.01641	0.996	0.984	0.965	0.940	0.895	0.840	0.778	0.711	0.638	0.561	0.479	0.393	0.304	0.213	0.120	0.058	0.027
64.00	0.00823	0.996	0.984	0.965	0.940	0.893	0.838	0.776	0.709	0.636	0.558	0.476	0.390	0.302	0.211	0.118	0.058	0.027
128.00	0.00412	0.996	0.984	0.965	0.940	0.892	0.836	0.775	0.707	0.634	0.557	0.475	0.389	0.301	0.210	0.117	0.058	0.027
256.00	0.00206	0.996	0.984	0.965	0.940	0.891	0.836	0.774	0.707	0.634	0.556	0.474	0.389	0.300	0.209	0.117	0.058	0.027
512.00	0.00103	0.996	0.984	0.965	0.939	0.891	0.836	0.774	0.706	0.634	0.556	0.474	0.388	0.300	0.209	0.117	0.058	0.027

(a-5) Wall half angle, 30°

0.64	0.53668	1.005	1.007	1.006	1.003	0.996	0.987	0.975	0.960	0.942	0.921	0.897	0.870	0.840	0.806	0.768	0.727	0.680
1.00	0.40933	1.002	1.000	0.995	0.985	0.970	0.952	0.929	0.903	0.872	0.837	0.800	0.759	0.707	0.595	0.454	0.279	0.072
2.00	0.23693	0.999	0.992	0.978	0.959	0.934	0.905	0.870	0.832	0.790	0.721	0.635	0.541	0.439	0.329	0.212	0.090	0.027
4.00	0.12627	0.997	0.987	0.970	0.946	0.917	0.882	0.843	0.790	0.715	0.634	0.547	0.454	0.357	0.256	0.152	0.051	0.023
8.00	0.06493	0.996	0.985	0.966	0.941	0.910	0.873	0.828	0.758	0.681	0.600	0.513	0.422	0.327	0.229	0.129	0.047	0.022
16.00	0.03288	0.996	0.984	0.965	0.939	0.907	0.869	0.814	0.743	0.666	0.585	0.498	0.408	0.314	0.217	0.119	0.046	0.021
32.00	0.01654	0.996	0.984	0.964	0.938	0.906	0.868	0.807	0.736	0.659	0.578	0.491	0.401	0.308	0.212	0.115	0.046	0.021
64.00	0.00829	0.996	0.984	0.964	0.938	0.905	0.867	0.804	0.733	0.656	0.574	0.488	0.398	0.305	0.209	0.112	0.046	0.021
128.00	0.00415	0.996	0.984	0.964	0.937	0.905	0.866	0.803	0.731	0.655	0.573	0.486	0.396	0.303	0.208	0.111	0.045	0.021
256.00	0.00208	0.996	0.984	0.964	0.937	0.905	0.866	0.802	0.731	0.654	0.572	0.486	0.396	0.303	0.207	0.111	0.045	0.021
512.00	0.00104	0.996	0.984	0.964	0.937	0.904	0.866	0.802	0.730	0.653	0.571	0.485	0.395	0.302	0.207	0.110	0.045	0.021

(a-6) Wall half-angle, 45°

0.75	0.47854	1.003	1.003	1.001	0.995	0.988	0.977	0.963	0.946	0.926	0.902	0.875	0.844	0.808	0.768	0.721	0.667	0.604
1.00	0.39880	1.002	1.000	0.995	0.986	0.973	0.956	0.935	0.910	0.881	0.846	0.807	0.764	0.715	0.663	0.609	0.457	0.172
2.00	0.23294	0.999	0.992	0.979	0.961	0.937	0.908	0.873	0.833	0.789	0.740	0.688	0.631	0.520	0.394	0.258	0.114	0.018
4.00	0.12490	0.997	0.987	0.971	0.947	0.917	0.882	0.841	0.795	0.744	0.690	0.613	0.510	0.401	0.288	0.170	0.049	0.014
8.00	0.06442	0.996	0.985	0.967	0.941	0.909	0.870	0.827	0.778	0.724	0.659	0.563	0.463	0.358	0.249	0.138	0.030	0.013
16.00	0.03268	0.996	0.984	0.965	0.938	0.905	0.865	0.820	0.770	0.715	0.637	0.542	0.442	0.339	0.233	0.125	0.029	0.013
32.00	0.01645	0.996	0.984	0.964	0.937	0.903	0.863	0.817	0.767	0.711	0.627	0.532	0.433	0.330	0.225	0.118	0.029	0.013
64.00	0.00825	0.996	0.984	0.964	0.936	0.902	0.862	0.816	0.765	0.709	0.622	0.527	0.428	0.326	0.222	0.115	0.029	0.013
128.00	0.00413	0.996	0.984	0.963	0.936	0.902	0.861	0.815	0.764	0.708	0.620	0.525	0.426	0.324	0.220	0.114	0.029	0.013
256.00	0.00207	0.996	0.983	0.963	0.936	0.902	0.861	0.815	0.764	0.708	0.618	0.524	0.425	0.323	0.219	0.113	0.029	0.013
512.00	0.00103	0.996	0.983	0.963	0.936	0.902	0.861	0.815	0.763	0.707	0.618	0.523	0.425	0.323	0.218	0.112	0.029	0.013

(a-7) Wall half-angle, 60°

0.92	0.40736	1.001	0.999	0.994	0.986	0.976	0.962	0.944	0.923	0.899	0.870	0.836	0.797	0.753	0.702	0.642	0.573	0.493
1.00	0.38675	1.001	0.998	0.993	0.984	0.972	0.957	0.938	0.914	0.887	0.855	0.818	0.776	0.727	0.671	0.607	0.535	0.459
2.00	0.22689	0.999	0.992	0.980	0.963	0.940	0.912	0.878	0.839	0.794	0.744	0.689	0.629	0.564	0.495	0.383	0.196	0.011
4.00	0.12215	0.997	0.988	0.972	0.949	0.920	0.884	0.843	0.796	0.744	0.687	0.626	0.560	0.490	0.370	0.229	0.083	0.008
8.00	0.06316	0.997	0.986	0.967	0.942	0.910	0.871	0.827	0.777	0.721	0.661	0.597	0.529	0.435	0.309	0.178	0.046	0.007
16.00	*0.03208*	*0.996*	*0.985*	*0.965*	*0.939*	*0.906*	*0.866*	*0.820*	0.768	0.711	0.649	0.584	0.514	0.406	0.283	0.158	0.030	0.007
32.00	0.01616	0.996	0.984	0.965	0.938	0.904	0.863	0.816	0.764	0.706	0.644	0.577	0.507	0.392	0.271	0.148	0.023	0.006
64.00	0.00811	0.996	0.984	0.964	0.937	0.903	0.862	0.814	0.762	0.704	0.641	0.574	0.503	0.386	0.266	0.143	0.020	0.006
128.00	0.00406	0.996	0.984	0.964	0.937	0.902	0.861	0.814	0.761	0.702	0.640	0.573	0.500	0.383	0.263	0.141	0.018	0.006
256.00	0.00203	0.996	0.984	0.964	0.936	0.902	0.861	0.813	0.760	0.702	0.639	0.572	0.498	0.381	0.262	0.140	0.017	0.006
512.00	0.00102	0.996	0.984	0.964	0.936	0.902	0.860	0.813	0.760	0.702	0.639	0.571	0.497	0.381	0.261	0.139	0.017	0.006

(a-8) Wall half-angle, 75°

1.42	0.29008	0.999	0.994	0.985	0.972	0.955	0.933	0.908	0.877	0.841	0.800	0.753	0.700	0.640	0.573	0.498	0.415	0.323
2.00	0.22032	0.998	0.991	0.980	0.963	0.942	0.915	0.883	0.845	0.802	0.753	0.698	0.637	0.570	0.497	0.418	0.335	0.246
4.00	0.11883	0.997	0.988	0.972	0.951	0.923	0.888	0.848	0.802	0.750	0.692	0.630	0.562	0.490	0.413	0.332	0.248	0.014
8.00	0.06153	0.997	0.986	0.969	0.944	0.913	0.875	0.831	0.781	0.725	0.664	0.598	0.528	0.453	0.375	0.294	0.156	0.002
16.00	0.03128	0.996	0.985	0.967	0.941	0.908	0.869	0.823	0.771	0.714	0.651	0.584	0.512	0.436	0.358	0.276	0.120	0.002
32.00	0.01576	0.996	0.985	0.966	0.939	0.906	0.866	0.819	0.767	0.708	0.645	0.577	0.504	0.428	0.349	0.267	0.105	0.002
64.00	0.00791	0.996	0.985	0.965	0.939	0.905	0.864	0.817	0.764	0.706	0.642	0.573	0.500	0.424	0.345	0.263	0.097	0.002
128.00	0.00396	0.996	0.984	0.965	0.938	0.904	0.864	0.816	0.763	0.704	0.640	0.571	0.499	0.422	0.343	0.261	0.094	0.002
256.00	0.00198	0.996	0.984	0.965	0.938	0.904	0.863	0.816	0.763	0.704	0.639	0.571	0.498	0.421	0.342	0.259	0.092	0.002
512.00	0.00099	0.996	0.984	0.965	0.938	0.904	0.863	0.816	0.762	0.703	0.639	0.570	0.497	0.421	0.341	0.258	0.091	0.002

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(b) Length to inlet width ratio, 0.50

(b-1) Wall half-angle, 0°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.50	0.57375	1.011	1.018	1.021	1.020	1.014	1.005	0.991	0.975	0.955	0.932	0.906	0.878	0.848	0.816	0.783	0.748	0.712
1.00	0.38014	1.003	1.000	0.991	0.978	0.961	0.942	0.900	0.851	0.795	0.731	0.656	0.571	0.472	0.360	0.234	0.139	0.065
2.00	0.21896	0.998	0.990	0.975	0.937	0.892	0.840	0.783	0.718	0.647	0.570	0.487	0.397	0.303	0.204	0.146	0.093	0.044
4.00	0.11717	0.997	0.976	0.939	0.895	0.845	0.788	0.726	0.657	0.584	0.505	0.422	0.334	0.244	0.178	0.128	0.081	0.039
8.00	0.06054	0.990	0.959	0.920	0.874	0.822	0.764	0.700	0.630	0.556	0.477	0.394	0.308	0.219	0.168	0.121	0.077	0.037
16.00	0.03076	0.983	0.950	0.910	0.864	0.811	0.752	0.687	0.617	0.543	0.464	0.381	0.295	0.213	0.164	0.118	0.075	0.036
32.00	0.01550	0.978	0.946	0.906	0.859	0.806	0.746	0.681	0.611	0.536	0.457	0.375	0.289	0.210	0.162	0.117	0.075	0.036
64.00	0.00778	0.976	0.944	0.904	0.857	0.803	0.744	0.679	0.608	0.533	0.454	0.372	0.286	0.209	0.161	0.116	0.074	0.036
128.00	0.00390	0.975	0.942	0.902	0.855	0.802	0.742	0.677	0.607	0.532	0.453	0.370	0.285	0.209	0.161	0.116	0.074	0.035
256.00	0.00195	0.975	0.942	0.902	0.855	0.801	0.742	0.676	0.606	0.531	0.452	0.370	0.284	0.208	0.161	0.116	0.074	0.035
512.00	0.00098	0.975	0.942	0.902	0.854	0.801	0.741	0.676	0.606	0.531	0.452	0.369	0.284	0.208	0.160	0.116	0.074	0.035

(b-2) Wall half-angle, 5°

0.54	0.55316	1.011	1.018	1.021	1.019	1.014	1.005	0.992	0.976	0.956	0.933	0.908	0.881	0.851	0.820	0.787	0.753	0.718
1.00	0.38582	1.004	1.002	0.994	0.982	0.966	0.947	0.925	0.888	0.834	0.771	0.698	0.612	0.513	0.396	0.262	0.142	0.066
2.00	0.22460	0.999	0.991	0.978	0.961	0.916	0.864	0.806	0.740	0.668	0.589	0.503	0.410	0.312	0.208	0.141	0.089	0.042
4.00	0.12081	0.997	0.988	0.960	0.915	0.863	0.805	0.741	0.671	0.595	0.514	0.428	0.338	0.244	0.169	0.121	0.076	0.036
8.00	0.06257	0.997	0.979	0.939	0.891	0.838	0.777	0.711	0.639	0.563	0.481	0.396	0.307	0.216	0.159	0.114	0.072	0.034
16.00	0.03183	0.996	0.969	0.928	0.880	0.825	0.764	0.697	0.625	0.548	0.467	0.381	0.293	0.203	0.154	0.111	0.070	0.033
32.00	0.01605	0.996	0.964	0.923	0.874	0.819	0.758	0.690	0.618	0.541	0.459	0.375	0.287	0.199	0.152	0.109	0.070	0.033
64.00	0.00806	0.996	0.962	0.920	0.871	0.816	0.754	0.687	0.615	0.537	0.456	0.371	0.283	0.197	0.151	0.109	0.069	0.033
128.00	0.00404	0.995	0.961	0.919	0.870	0.815	0.753	0.686	0.613	0.536	0.454	0.369	0.282	0.197	0.151	0.108	0.069	0.033
256.00	0.00202	0.995	0.960	0.918	0.869	0.814	0.752	0.685	0.612	0.535	0.453	0.369	0.281	0.197	0.151	0.108	0.069	0.033
512.00	0.00101	0.994	0.960	0.918	0.869	0.813	0.752	0.684	0.612	0.534	0.453	0.368	0.281	0.196	0.151	0.108	0.069	0.033

(b-3) Wall half-angle, 10°

0.59	0.52697	1.010	1.017	1.019	1.018	1.013	1.004	0.991	0.975	0.956	0.934	0.909	0.881	0.852	0.821	0.788	0.755	0.720
1.00	0.38888	1.005	1.004	0.998	0.987	0.972	0.953	0.931	0.907	0.883	0.828	0.757	0.673	0.573	0.453	0.309	0.148	0.067
2.00	0.22920	0.999	0.992	0.979	0.962	0.941	0.900	0.840	0.773	0.699	0.617	0.527	0.431	0.327	0.217	0.134	0.083	0.039
4.00	0.12405	0.997	0.988	0.972	0.944	0.891	0.831	0.764	0.691	0.612	0.528	0.439	0.345	0.247	0.158	0.112	0.070	0.033
8.00	0.06444	0.997	0.986	0.966	0.917	0.861	0.798	0.729	0.655	0.575	0.490	0.401	0.309	0.214	0.147	0.104	0.066	0.031
16.00	0.03282	0.996	0.985	0.954	0.903	0.846	0.782	0.713	0.638	0.557	0.473	0.385	0.293	0.199	0.142	0.101	0.064	0.030
32.00	0.01656	0.996	0.985	0.948	0.897	0.839	0.775	0.705	0.629	0.549	0.465	0.376	0.285	0.192	0.140	0.100	0.063	0.030
64.00	0.00832	0.996	0.985	0.945	0.893	0.835	0.771	0.701	0.625	0.545	0.461	0.373	0.282	0.188	0.139	0.099	0.063	0.030
128.00	0.00417	0.996	0.985	0.943	0.892	0.834	0.769	0.699	0.623	0.543	0.459	0.371	0.280	0.187	0.139	0.099	0.063	0.030
256.00	0.00209	0.996	0.985	0.942	0.891	0.833	0.768	0.698	0.622	0.542	0.458	0.370	0.279	0.186	0.139	0.099	0.063	0.030
512.00	0.00104	0.996	0.985	0.942	0.891	0.832	0.768	0.698	0.622	0.542	0.457	0.369	0.278	0.185	0.139	0.099	0.063	0.030

(b-4) Wall half-angle, 20°

0.68	0.48089	1.009	1.014	1.016	1.014	1.009	0.999	0.987	0.971	0.951	0.929	0.904	0.876	0.846	0.814	0.781	0.746	0.711
1.00	0.3*639	1.005	1.006	1.002	0.993	0.981	0.963	0.943	0.919	0.892	0.864	0.835	0.804	0.709	0.589	0.434	0.234	0.073
2.00	0.23210	1.000	0.994	0.982	0.964	0.942	0.916	0.888	0.846	0.769	0.682	0.587	0.482	0.368	0.246	0.122	0.074	0.034
4.00	0.12689	0.998	0.988	0.972	0.950	0.925	0.889	0.818	0.740	0.655	0.565	0.468	0.366	0.260	0.150	0.097	0.060	0.028
8.00	0.06624	0.997	0.985	0.968	0.945	0.913	0.846	0.772	0.692	0.606	0.515	0.419	0.320	0.217	0.126	0.089	0.055	0.026
16.00	0.03382	0.996	0.984	0.966	0.942	0.894	0.825	0.750	0.669	0.583	0.492	0.397	0.299	0.198	0.122	0.086	0.053	0.025
32.00	0.01709	0.996	0.984	0.965	0.941	0.885	0.815	0.740	0.659	0.572	0.482	0.387	0.289	0.189	0.120	0.084	0.053	0.025
64.00	0.00859	0.996	0.984	0.965	0.940	0.880	0.810	0.735	0.653	0.567	0.476	0.382	0.285	0.185	0.118	0.083	0.052	0.024
128.00	0.00430	0.996	0.983	0.965	0.940	0.878	0.808	0.732	0.651	0.565	0.474	0.380	0.282	0.183	0.118	0.083	0.052	0.024
256.00	0.00216	0.996	0.983	0.964	0.940	0.877	0.807	0.731	0.650	0.563	0.473	0.378	0.281	0.182	0.118	0.083	0.052	0.024
512.00	0.00108	0.996	0.983	0.964	0.939	0.876	0.806	0.730	0.649	0.563	0.472	0.378	0.281	0.181	0.118	0.083	0.052	0.024

(b-5) Wall half-angle, 30°

0.79	0.43026	1.007	1.011	1.011	1.008	1.002	0.992	0.979	0.962	0.942	0.919	0.893	0.864	0.833	0.799	0.763	0.725	0.686
1.00	0.37641	1.005	1.007	1.004	0.997	0.987	0.972	0.954	0.931	0.905	0.876	0.845	0.811	0.777	0.746	0.672	0.456	0.120
2.00	0.22998	1.001	0.995	0.984	0.967	0.945	0.919	0.889	0.857	0.822	0.787	0.685	0.571	0.444	0.305	0.154	0.065	0.028
4.00	0.12700	0.998	0.988	0.972	0.950	0.923	0.891	0.856	0.819	0.727	0.628	0.522	0.410	0.291	0.169	0.080	0.048	0.022
8.00	0.06663	0.997	0.985	0.967	0.942	0.913	0.878	0.841	0.754	0.660	0.561	0.456	0.347	0.234	0.119	0.072	0.044	0.020
16.00	0.03410	0.996	0.984	0.965	0.939	0.908	0.872	0.812	0.723	0.629	0.530	0.427	0.319	0.209	0.100	0.069	0.042	0.019
32.00	0.01725	0.996	0.983	0.963	0.937	0.905	0.869	0.798	0.709	0.615	0.516	0.413	0.306	0.197	0.097	0.067	0.041	0.019
64.00	0.00867	0.996	0.983	0.963	0.936	0.904	0.867	0.791	0.702	0.608	0.509	0.406	0.300	0.192	0.096	0.067	0.041	0.019
128.00	0.00435	0.996	0.983	0.963	0.936	0.904	0.867	0.787	0.699	0.604	0.506	0.403	0.297	0.189	0.096	0.066	0.041	0.019
256.00	0.00218	0.996	0.983	0.962	0.936	0.903	0.866	0.786	0.697	0.603	0.504	0.401	0.296	0.188	0.096	0.066	0.041	0.019
512.00	0.00109	0.996	0.983	0.962	0.936	0.903	0.866	0.785	0.696	0.602	0.503	0.400	0.295	0.187	0.095	0.066	0.041	0.019

(b-6) Wall half-angle, 45°

1.00	0.35582	1.004	1.005	1.003	0.998	0.989	0.978	0.962	0.944	0.922	0.896	0.867	0.835	0.799	0.759	0.716	0.669	0.620
2.00	0.22112	1.001	0.996	0.986	0.971	0.951	0.927	0.897	0.863	0.826	0.785	0.741	0.696	0.649	0.493	0.297	0.080	0.021
4.00	0.12360	0.998	0.989	0.974	0.952	0.925	0.892	0.855	0.813	0.768	0.720	0.669	0.537	0.395	0.244	0.088	0.033	0.014
8.00	0.06526	0.997	0.986	0.968	0.943	0.911	0.875	0.833	0.787	0.738	0.685	0.563	0.434	0.300	0.163	0.049	0.029	0.012
16.00	0.03351	0.996	0.984	0.965	0.938	0.905	0.866	0.822	0.774	0.723	0.637	0.516	0.390	0.261	0.128	0.046	0.027	0.012
32.00	0.01698	0.996	0.983	0.963	0.936	0.902	0.862	0.817	0.768	0.715	0.614	0.494	0.370	0.242	0.113	0.045	0.026	0.011
64.00	0.00855	0.996	0.983	0.962	0.934	0.900	0.860	0.814	0.765	0.711	0.603	0.484	0.360	0.234	0.105	0.044	0.026	0.011
128.00	0.00429	0.996	0.983	0.962	0.934	0.899	0.859	0.813	0.763	0.709	0.598	0.478	0.355	0.229	0.102	0.044	0.026	0.011
256.00	0.00215	0.996	0.983	0.962	0.934	0.899	0.858	0.812	0.762	0.708	0.595	0.476	0.353	0.227	0.100	0.044	0.026	0.011
512.00	0.00107	0.996	0.983	0.962	0.933	0.899	0.858	0.812	0.762	0.708	0.594	0.475	0.352	0.226	0.099	0.044	0.026	0.011

(b-7) Wall half-angle, 60°

1.35	0.27838	1.001	0.999	0.994	0.986	0.974	0.959	0.940	0.917	0.890	0.859	0.825	0.785	0.741	0.692	0.638	0.578	0.513
2.00	0.21001	1.000	0.996	0.987	0.974	0.956	0.934	0.907	0.875	0.838	0.797	0.751	0.701	0.647	0.589	0.528	0.437	0.022
4.00	0.11832	0.998	0.990	0.976	0.956	0.929	0.898	0.860	0.818	0.771	0.719	0.664	0.604	0.541	0.458	0.244	0.022	0.008
8.00	0.06278	0.997	0.987	0.969	0.945	0.914	0.878	0.835	0.787	0.735	0.678	0.617	0.553	0.473	0.296	0.113	0.016	0.006
16.00	0.03233	0.996	0.985	0.966	0.940	0.907	0.867	0.822	0.772	0.717	0.657	0.594	0.527	0.401	0.233	0.063	0.015	0.006
32.00	0.01640	0.996	0.984	0.964	0.937	0.903	0.862	0.816	0.764	0.708	0.647	0.582	0.514	0.368	0.206	0.041	0.014	0.006
64.00	0.00826	0.996	0.984	0.963	0.936	0.901	0.860	0.813	0.760	0.703	0.641	0.576	0.507	0.353	0.193	0.031	0.014	0.006
128.00	0.00414	0.996	0.983	0.963	0.935	0.900	0.859	0.811	0.758	0.701	0.639	0.573	0.501	0.345	0.186	0.026	0.014	0.005
256.00	0.00208	0.996	0.983	0.963	0.935	0.900	0.858	0.810	0.757	0.699	0.637	0.571	0.497	0.341	0.183	0.025	0.014	0.005
512.00	0.00104	0.996	0.983	0.963	0.935	0.899	0.858	0.810	0.757	0.699	0.637	0.571	0.495	0.340	0.182	0.025	0.014	0.005

(b-8) Wall half-angle, 75°

2.35	0.17638	0.999	0.993	0.983	0.969	0.951	0.928	0.901	0.869	0.832	0.790	0.742	0.689	0.631	0.567	0.496	0.420	0.337
4.00	0.11292	0.998	0.990	0.977	0.958	0.934	0.905	0.869	0.829	0.782	0.731	0.674	0.612	0.545	0.474	0.397	0.317	0.106
8.00	0.06008	0.997	0.987	0.971	0.948	0.919	0.884	0.843	0.796	0.743	0.685	0.622	0.554	0.483	0.407	0.327	0.207	0.002
16.00	0.03099	0.997	0.986	0.968	0.943	0.911	0.873	0.829	0.778	0.722	0.661	0.595	0.525	0.451	0.373	0.293	0.091	0.002
32.00	0.01574	0.996	0.985	0.966	0.940	0.907	0.868	0.822	0.769	0.712	0.649	0.582	0.510	0.435	0.357	0.276	0.046	0.002
64.00	0.00793	0.996	0.985	0.965	0.939	0.905	0.865	0.818	0.765	0.707	0.643	0.575	0.503	0.427	0.349	0.267	0.026	0.001
128.00	0.00398	0.996	0.984	0.965	0.938	0.904	0.863	0.816	0.763	0.704	0.640	0.572	0.499	0.423	0.344	0.263	0.016	0.001
256.00	0.00199	0.996	0.984	0.965	0.938	0.904	0.863	0.815	0.762	0.703	0.639	0.570	0.497	0.421	0.342	0.261	0.012	0.001
512.00	0.00100	0.996	0.984	0.965	0.938	0.903	0.862	0.815	0.761	0.702	0.638	0.569	0.497	0.420	0.341	0.258	0.010	0.001

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(c) Length to inlet width ratio, 1.00

(c-1) Wall half-angle, 0°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg															
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.50	0.49514	1.015	1.025	1.029	1.027	1.021	1.010	0.994	0.974	0.951	0.924	0.895	0.863	0.829	0.793	0.755	0.715	0.674
1.00	0.33747	1.005	1.003	0.994	0.981	0.964	0.945	0.890	0.827	0.757	0.678	0.587	0.484	0.368	0.279	0.200	0.126	0.059
2.00	0.20158	0.999	0.992	0.976	0.922	0.861	0.794	0.720	0.639	0.552	0.458	0.358	0.293	0.234	0.179	0.128	0.081	0.038
4.00	0.11143	0.997	0.966	0.911	0.849	0.781	0.707	0.627	0.542	0.452	0.357	0.299	0.246	0.197	0.151	0.108	0.069	0.033
8.00	0.05887	0.985	0.933	0.875	0.810	0.739	0.662	0.580	0.494	0.403	0.328	0.275	0.227	0.181	0.139	0.100	0.064	0.030
16.00	0.03031	0.969	0.916	0.856	0.789	0.717	0.639	0.556	0.469	0.378	0.314	0.264	0.218	0.174	0.134	0.097	0.062	0.029
32.00	0.01539	0.961	0.907	0.846	0.779	0.706	0.628	0.544	0.457	0.366	0.308	0.259	0.214	0.171	0.132	0.095	0.061	0.029
64.00	0.00775	0.957	0.902	0.841	0.774	0.701	0.622	0.538	0.451	0.360	0.305	0.256	0.211	0.170	0.130	0.094	0.060	0.029
128.00	0.00389	0.955	0.900	0.839	0.771	0.698	0.619	0.535	0.448	0.357	0.303	0.255	0.210	0.169	0.130	0.094	0.060	0.029
256.00	0.00195	0.954	0.899	0.838	0.770	0.696	0.617	0.534	0.446	0.355	0.302	0.254	0.210	0.168	0.130	0.093	0.060	0.029
512.00	0.00098	0.953	0.899	0.837	0.769	0.696	0.617	0.533	0.445	0.354	0.302	0.254	0.210	0.168	0.129	0.093	0.060	0.029

(c-2) Wall half-angle, 5°

0.58	0.46472	1.014	1.024	1.027	1.026	1.020	1.009	0.994	0.975	0.952	0.926	0.897	0.866	0.833	0.798	0.762	0.724	0.684
1.00	0.34743	1.007	1.006	1.000	0.989	0.973	0.954	0.933	0.911	0.846	0.771	0.685	0.584	0.465	0.326	0.229	0.143	0.066
2.00	0.21164	1.000	0.993	0.981	0.966	0.917	0.849	0.773	0.691	0.601	0.503	0.398	0.299	0.237	0.180	0.127	0.080	0.037
4.00	0.11811	0.998	0.989	0.957	0.893	0.823	0.746	0.663	0.574	0.479	0.380	0.296	0.242	0.192	0.146	0.104	0.066	0.031
8.00	0.06269	0.997	0.976	0.915	0.847	0.773	0.693	0.607	0.516	0.421	0.322	0.268	0.219	0.175	0.133	0.095	0.060	0.029
16.00	0.03235	0.996	0.956	0.893	0.823	0.747	0.666	0.579	0.488	0.392	0.307	0.256	0.210	0.167	0.128	0.091	0.058	0.028
32.00	0.01644	0.996	0.945	0.881	0.811	0.735	0.652	0.565	0.474	0.378	0.299	0.250	0.205	0.163	0.125	0.089	0.057	0.027
64.00	0.00829	0.996	0.940	0.876	0.805	0.728	0.646	0.558	0.466	0.371	0.296	0.247	0.203	0.162	0.124	0.089	0.056	0.027
128.00	0.00416	0.995	0.937	0.873	0.802	0.725	0.642	0.555	0.463	0.368	0.294	0.246	0.202	0.161	0.123	0.088	0.056	0.027
256.00	0.00208	0.993	0.936	0.872	0.800	0.723	0.641	0.553	0.461	0.366	0.293	0.245	0.201	0.160	0.123	0.088	0.056	0.027
512.00	0.00104	0.993	0.935	0.871	0.800	0.722	0.640	0.552	0.460	0.365	0.293	0.245	0.201	0.160	0.123	0.088	0.056	0.027

(c-3) Wall half-angle, 10°

0.68	0.42800	1.013	1.022	1.025	1.023	1.017	1.006	0.992	0.973	0.951	0.926	0.898	0.867	0.835	0.801	0.766	0.730	0.692
1.00	0.35084	1.008	1.010	1.007	0.998	0.984	0.967	0.946	0.923	0.899	0.876	0.822	0.732	0.621	0.481	0.304	0.179	0.080
2.00	0.21870	1.001	0.996	0.984	0.968	0.950	0.928	0.851	0.767	0.674	0.571	0.460	0.338	0.243	0.182	0.127	0.079	0.036
4.00	0.12347	0.998	0.989	0.975	0.957	0.883	0.802	0.715	0.621	0.521	0.415	0.304	0.236	0.185	0.140	0.098	0.062	0.029
8.00	0.06591	0.997	0.987	0.972	0.901	0.822	0.737	0.647	0.551	0.449	0.344	0.259	0.210	0.165	0.125	0.089	0.056	0.026
16.00	0.03410	0.996	0.986	0.945	0.872	0.791	0.705	0.613	0.516	0.415	0.310	0.245	0.199	0.157	0.119	0.084	0.053	0.025
32.00	0.01735	0.996	0.985	0.932	0.857	0.776	0.689	0.596	0.499	0.398	0.293	0.238	0.194	0.153	0.116	0.083	0.052	0.025
64.00	0.00876	0.996	0.985	0.925	0.850	0.768	0.680	0.588	0.490	0.389	0.285	0.235	0.191	0.151	0.115	0.082	0.052	0.024
128.00	0.00440	0.996	0.985	0.922	0.846	0.764	0.676	0.583	0.486	0.385	0.282	0.233	0.190	0.150	0.114	0.081	0.051	0.024
256.00	0.00220	0.996	0.985	0.920	0.844	0.762	0.674	0.581	0.484	0.383	0.281	0.233	0.189	0.150	0.114	0.081	0.051	0.024
512.00	0.00110	0.996	0.985	0.919	0.843	0.761	0.673	0.580	0.483	0.382	0.280	0.232	0.189	0.150	0.114	0.081	0.051	0.024

(c-4) Wall half-angle, 20°

0.86	0.36840	1.011	1.018	1.020	1.017	1.011	1.000	0.985	0.967	0.945	0.921	0.893	0.864	0.832	0.799	0.765	0.731	0.697
1.00	0.34186	1.009	1.014	1.014	1.009	0.999	0.986	0.968	0.947	0.923	0.896	0.868	0.838	0.810	0.784	0.736	0.533	0.176
2.00	0.22071	1.003	0.999	0.989	0.974	0.954	0.932	0.909	0.885	0.842	0.733	0.612	0.476	0.324	0.191	0.129	0.077	0.034
4.00	0.12703	0.999	0.990	0.975	0.956	0.933	0.910	0.835	0.732	0.620	0.502	0.376	0.243	0.174	0.128	0.088	0.054	0.025
8.00	0.06845	0.997	0.986	0.969	0.948	0.924	0.839	0.738	0.631	0.518	0.400	0.277	0.193	0.149	0.110	0.077	0.047	0.022
16.00	0.03558	0.996	0.984	0.966	0.944	0.889	0.793	0.691	0.583	0.470	0.353	0.232	0.179	0.139	0.103	0.072	0.045	0.021
32.00	0.01815	0.996	0.983	0.965	0.942	0.867	0.771	0.668	0.559	0.447	0.330	0.217	0.173	0.134	0.100	0.070	0.044	0.020
64.00	0.00917	0.995	0.983	0.964	0.941	0.857	0.759	0.656	0.548	0.435	0.319	0.213	0.170	0.132	0.099	0.069	0.043	0.020
128.00	0.00461	0.995	0.983	0.964	0.940	0.851	0.754	0.650	0.542	0.429	0.313	0.211	0.169	0.131	0.098	0.069	0.043	0.020
256.00	0.00231	0.995	0.983	0.964	0.940	0.849	0.751	0.647	0.539	0.426	0.311	0.210	0.168	0.131	0.098	0.069	0.043	0.020
512.00	0.00116	0.995	0.982	0.963	0.939	0.847	0.749	0.646	0.538	0.425	0.309	0.210	0.168	0.131	0.098	0.068	0.043	0.020

(c-5) Wall half-angle, 30°

1.08	0.30965	1.008	1.013	1.013	1.010	1.002	0.991	0.976	0.957	0.935	0.911	0.883	0.854	0.822	0.789	0.755	0.721	0.688
2.00	0.21386	1.003	1.001	0.993	0.980	0.963	0.941	0.916	0.889	0.860	0.831	0.805	0.728	0.556	0.356	0.143	0.080	0.033
4.00	0.12548	0.999	0.991	0.977	0.957	0.933	0.905	0.876	0.845	0.788	0.653	0.508	0.353	0.188	0.117	0.078	0.046	0.020
8.00	0.06828	0.997	0.986	0.969	0.946	0.918	0.887	0.854	0.764	0.636	0.501	0.359	0.212	0.131	0.094	0.064	0.038	0.017
16.00	0.03567	0.996	0.984	0.965	0.939	0.910	0.877	0.817	0.694	0.566	0.432	0.294	0.158	0.119	0.086	0.059	0.036	0.016
32.00	0.01824	0.996	0.983	0.962	0.936	0.906	0.872	0.783	0.661	0.532	0.400	0.263	0.150	0.114	0.083	0.057	0.034	0.016
64.00	0.00922	0.995	0.982	0.961	0.935	0.903	0.869	0.767	0.644	0.516	0.384	0.249	0.147	0.111	0.081	0.056	0.034	0.015
128.00	0.00464	0.995	0.982	0.961	0.934	0.902	0.867	0.759	0.636	0.508	0.376	0.241	0.145	0.110	0.081	0.055	0.034	0.015
256.00	0.00233	0.995	0.982	0.961	0.933	0.902	0.867	0.755	0.632	0.504	0.372	0.238	0.144	0.110	0.080	0.055	0.034	0.015
512.00	0.00116	0.995	0.982	0.960	0.933	0.901	0.866	0.752	0.630	0.502	0.370	0.236	0.144	0.109	0.080	0.055	0.033	0.015

(c-6) Wall half-angle, 45°

1.50	0.23473	1.005	1.006	1.003	0.998	0.988	0.975	0.958	0.939	0.915	0.889	0.860	0.828	0.794	0.758	0.721	0.682	0.644
2.00	0.19683	1.003	1.002	0.996	0.987	0.973	0.955	0.933	0.907	0.878	0.846	0.811	0.775	0.738	0.702	0.670	0.402	0.046
4.00	0.11811	1.000	0.993	0.981	0.962	0.939	0.911	0.879	0.843	0.805	0.765	0.724	0.683	0.477	0.239	0.067	0.035	0.014
8.00	0.06510	0.997	0.988	0.971	0.947	0.918	0.884	0.847	0.805	0.761	0.715	0.604	0.415	0.217	0.073	0.046	0.026	0.011
16.00	0.03423	0.996	0.985	0.965	0.939	0.907	0.870	0.828	0.784	0.736	0.657	0.483	0.303	0.118	0.063	0.040	0.023	0.010
32.00	0.01756	0.996	0.983	0.962	0.935	0.901	0.862	0.819	0.772	0.722	0.599	0.428	0.253	0.086	0.059	0.038	0.022	0.009
64.00	0.00889	0.996	0.982	0.961	0.933	0.898	0.858	0.814	0.766	0.715	0.571	0.402	0.230	0.083	0.057	0.037	0.021	0.009
128.00	0.00448	0.995	0.982	0.960	0.932	0.896	0.856	0.811	0.762	0.711	0.558	0.389	0.218	0.081	0.056	0.036	0.021	0.009
256.00	0.00224	0.995	0.982	0.960	0.931	0.896	0.855	0.810	0.761	0.709	0.551	0.383	0.212	0.081	0.056	0.036	0.021	0.009
512.00	0.00112	0.995	0.982	0.960	0.931	0.895	0.854	0.809	0.760	0.708	0.547	0.380	0.210	0.080	0.055	0.036	0.021	0.009

(c-7) Wall half-angle, 60°

2.20	0.16930	1.001	0.999	0.994	0.985	0.972	0.956	0.936	0.913	0.886	0.855	0.821	0.784	0.743	0.698	0.650	0.599	0.544
4.00	0.10938	0.999	0.994	0.983	0.967	0.947	0.921	0.891	0.857	0.818	0.775	0.728	0.679	0.626	0.571	0.513	0.101	0.010
8.00	0.06085	0.998	0.989	0.973	0.952	0.924	0.891	0.853	0.810	0.762	0.711	0.656	0.598	0.537	0.356	0.044	0.016	0.006
16.00	0.03216	0.997	0.986	0.968	0.943	0.911	0.874	0.831	0.783	0.730	0.674	0.614	0.551	0.429	0.165	0.025	0.013	0.005
32.00	0.01654	0.996	0.984	0.965	0.938	0.904	0.864	0.819	0.768	0.713	0.654	0.592	0.526	0.336	0.088	0.023	0.011	0.004
64.00	0.00839	0.996	0.983	0.963	0.935	0.900	0.859	0.813	0.761	0.704	0.644	0.580	0.514	0.294	0.054	0.021	0.011	0.004
128.00	0.00422	0.996	0.983	0.962	0.934	0.899	0.857	0.809	0.757	0.700	0.639	0.574	0.507	0.274	0.038	0.021	0.011	0.004
256.00	0.00212	0.996	0.983	0.962	0.933	0.898	0.856	0.808	0.755	0.697	0.636	0.572	0.497	0.264	0.036	0.021	0.011	0.004
512.00	0.00106	0.996	0.983	0.962	0.933	0.897	0.855	0.807	0.754	0.696	0.635	0.570	0.491	0.259	0.036	0.021	0.011	0.004

(c-8) Wall half-angle, 75°

4.20	0.09826	0.999	0.993	0.983	0.969	0.950	0.927	0.899	0.867	0.830	0.788	0.742	0.690	0.634	0.572	0.505	0.432	0.354
8.00	0.05702	0.998	0.989	0.976	0.956	0.931	0.901	0.864	0.823	0.776	0.724	0.667	0.605	0.539	0.468	0.392	0.313	0.004
16.00	0.03023	0.997	0.987	0.970	0.947	0.918	0.882	0.841	0.793	0.740	0.682	0.619	0.552	0.481	0.405	0.326	0.131	0.001
32.00	0.01557	0.996	0.986	0.967	0.942	0.910	0.872	0.827	0.777	0.721	0.660	0.594	0.524	0.450	0.373	0.293	0.005	0.001
64.00	0.00791	0.996	0.985	0.966	0.940	0.907	0.867	0.820	0.768	0.711	0.648	0.581	0.509	0.434	0.356	0.276	0.004	0.001
128.00	0.00398	0.996	0.984	0.965	0.938	0.905	0.864	0.817	0.764	0.705	0.642	0.574	0.502	0.427	0.348	0.267	0.004	0.001
256.00	0.00200	0.996	0.984	0.965	0.938	0.904	0.863	0.815	0.762	0.703	0.639	0.571	0.498	0.423	0.344	0.263	0.004	0.001
512.00	0.00100	0.996	0.984	0.965	0.937	0.903	0.862	0.814	0.761	0.702	0.637	0.569	0.497	0.421	0.342	0.261	0.004	0.001

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(d) Length to inlet width ratio, 2.00

(d-1) Wall half-angle, 0°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.50	0.40032	1.017	1.027	1.031	1.029	1.020	1.007	0.988	0.965	0.938	0.908	0.875	0.839	0.800	0.759	0.717	0.672	0.624
1.00	0.28188	1.006	1.004	0.995	0.981	0.964	0.945	0.865	0.778	0.682	0.575	0.470	0.390	0.315	0.243	0.175	0.111	0.052
2.00	0.17626	1.000	0.993	0.975	0.891	0.800	0.702	0.597	0.489	0.417	0.354	0.297	0.244	0.195	0.150	0.107	0.068	0.032
4.00	0.10206	0.998	0.947	0.857	0.760	0.658	0.549	0.453	0.388	0.333	0.283	0.238	0.196	0.157	0.120	0.086	0.055	0.026
8.00	0.05591	0.974	0.884	0.787	0.684	0.576	0.465	0.398	0.343	0.294	0.251	0.211	0.174	0.140	0.107	0.077	0.049	0.024
16.00	0.02946	0.943	0.849	0.748	0.642	0.531	0.433	0.372	0.321	0.276	0.235	0.198	0.163	0.131	0.101	0.073	0.047	0.022
32.00	0.01516	0.926	0.830	0.728	0.620	0.508	0.417	0.359	0.309	0.266	0.227	0.191	0.158	0.127	0.098	0.071	0.045	0.022
64.00	0.00769	0.918	0.821	0.718	0.609	0.496	0.409	0.352	0.304	0.262	0.223	0.188	0.155	0.125	0.096	0.069	0.044	0.021
128.00	0.00388	0.913	0.816	0.712	0.603	0.490	0.405	0.349	0.301	0.259	0.221	0.186	0.154	0.124	0.095	0.069	0.044	0.021
256.00	0.00195	0.911	0.814	0.710	0.601	0.487	0.403	0.347	0.300	0.258	0.220	0.186	0.153	0.123	0.095	0.069	0.044	0.021
512.00	0.00097	0.910	0.812	0.708	0.599	0.485	0.402	0.346	0.299	0.257	0.220	0.185	0.153	0.123	0.095	0.068	0.044	0.021

(d-2) Wall half-angle, 5°

0.66	0.36091	1.016	1.025	1.028	1.026	1.018	1.004	0.986	0.964	0.938	0.909	0.877	0.842	0.805	0.766	0.725	0.682	0.636
1.00	0.29682	1.009	1.012	1.007	0.996	0.981	0.962	0.940	0.916	0.894	0.812	0.709	0.589	0.447	0.346	0.251	0.159	0.073
2.00	0.19224	1.002	0.996	0.985	0.971	0.937	0.840	0.734	0.620	0.496	0.400	0.331	0.269	0.213	0.162	0.115	0.072	0.034
4.00	0.11328	0.998	0.991	0.964	0.865	0.758	0.645	0.526	0.418	0.352	0.296	0.246	0.201	0.159	0.121	0.086	0.055	0.026
8.00	0.06263	0.997	0.977	0.876	0.769	0.656	0.537	0.421	0.356	0.302	0.255	0.212	0.174	0.138	0.106	0.076	0.048	0.023
16.00	0.03317	0.997	0.933	0.828	0.717	0.600	0.479	0.386	0.328	0.279	0.236	0.197	0.161	0.129	0.098	0.071	0.045	0.021
32.00	0.01711	0.996	0.910	0.803	0.690	0.572	0.449	0.370	0.315	0.268	0.226	0.189	0.155	0.124	0.095	0.068	0.043	0.021
64.00	0.00869	0.996	0.898	0.790	0.676	0.557	0.433	0.361	0.308	0.262	0.222	0.185	0.152	0.122	0.093	0.067	0.043	0.020
128.00	0.00438	0.994	0.892	0.784	0.669	0.550	0.426	0.357	0.305	0.259	0.220	0.184	0.151	0.120	0.092	0.066	0.042	0.020
256.00	0.00220	0.991	0.889	0.780	0.666	0.546	0.422	0.355	0.303	0.258	0.218	0.183	0.150	0.120	0.092	0.066	0.042	0.020
512.00	0.00110	0.990	0.888	0.779	0.664	0.544	0.420	0.354	0.302	0.257	0.218	0.182	0.150	0.119	0.092	0.066	0.042	0.020

(d-3) Wall half-angle, 10°

0.86	0.31735	1.014	1.022	1.025	1.022	1.014	1.001	0.983	0.962	0.937	0.908	0.877	0.844	0.809	0.772	0.733	0.692	0.650
1.00	0.29705	1.012	1.018	1.018	1.012	1.001	0.985	0.965	0.942	0.916	0.888	0.858	0.828	0.799	0.737	0.590	0.364	0.177
2.00	0.20037	1.004	1.000	0.991	0.976	0.959	0.941	0.924	0.814	0.688	0.550	0.397	0.315	0.245	0.183	0.128	0.079	0.036
4.00	0.12063	0.999	0.991	0.979	0.964	0.900	0.781	0.654	0.519	0.384	0.315	0.257	0.206	0.161	0.121	0.086	0.053	0.025
8.00	0.06741	0.997	0.988	0.975	0.887	0.766	0.639	0.505	0.375	0.311	0.258	0.212	0.171	0.135	0.102	0.072	0.045	0.021
16.00	0.03590	0.996	0.986	0.938	0.820	0.695	0.564	0.429	0.337	0.281	0.234	0.193	0.156	0.123	0.094	0.067	0.042	0.020
32.00	0.01857	0.996	0.986	0.906	0.785	0.658	0.526	0.390	0.320	0.267	0.223	0.184	0.149	0.118	0.090	0.064	0.040	0.019
64.00	0.00945	0.996	0.985	0.889	0.768	0.640	0.507	0.372	0.311	0.261	0.218	0.180	0.146	0.116	0.088	0.063	0.040	0.019
128.00	0.00477	0.996	0.985	0.881	0.759	0.630	0.497	0.367	0.307	0.257	0.215	0.178	0.144	0.114	0.087	0.062	0.039	0.019
256.00	0.00240	0.996	0.985	0.877	0.754	0.626	0.493	0.364	0.305	0.256	0.214	0.177	0.144	0.114	0.086	0.062	0.039	0.018
512.00	0.00120	0.995	0.985	0.875	0.752	0.623	0.490	0.363	0.304	0.255	0.213	0.176	0.143	0.113	0.086	0.061	0.039	0.018

(d-4) Wall half-angle, 20°

1.22	0.25434	1.011	1.018	1.019	1.015	1.006	0.993	0.976	0.955	0.931	0.904	0.875	0.844	0.811	0.777	0.742	0.706	0.670
2.00	0.19689	1.006	1.006	1.000	0.988	0.972	0.953	0.931	0.908	0.885	0.864	0.842	0.667	0.460	0.267	0.176	0.103	0.044
4.00	0.12279	1.001	0.994	0.981	0.964	0.945	0.924	0.905	0.794	0.632	0.457	0.291	0.223	0.168	0.122	0.084	0.051	0.023
8.00	0.06987	0.998	0.988	0.972	0.953	0.933	0.864	0.712	0.552	0.384	0.268	0.212	0.166	0.127	0.094	0.065	0.040	0.018
16.00	0.03755	0.996	0.985	0.968	0.947	0.900	0.751	0.596	0.434	0.288	0.231	0.184	0.146	0.112	0.083	0.058	0.036	0.017
32.00	0.01952	0.996	0.983	0.965	0.944	0.845	0.694	0.538	0.377	0.267	0.215	0.173	0.137	0.106	0.079	0.055	0.034	0.016
64.00	0.00996	0.995	0.982	0.964	0.942	0.817	0.666	0.509	0.348	0.257	0.208	0.167	0.133	0.103	0.077	0.054	0.033	0.016
128.00	0.00503	0.995	0.982	0.963	0.941	0.803	0.651	0.495	0.334	0.252	0.204	0.164	0.131	0.101	0.076	0.053	0.033	0.015
256.00	0.00253	0.995	0.982	0.962	0.941	0.796	0.644	0.487	0.327	0.250	0.202	0.163	0.130	0.101	0.075	0.053	0.033	0.015
512.00	0.00127	0.995	0.981	0.962	0.939	0.793	0.641	0.484	0.323	0.249	0.202	0.163	0.129	0.100	0.075	0.053	0.033	0.015

(d-5) Wall half-angle, 30°

1.66	0.19996	1.008	1.012	1.011	1.006	0.997	0.983	0.966	0.946	0.923	0.897	0.869	0.839	0.808	0.776	0.744	0.712	0.683
2.00	0.18195	1.007	1.009	1.006	0.998	0.986	0.970	0.950	0.927	0.902	0.875	0.847	0.819	0.792	0.769	0.753	0.398	0.098
4.00	0.11732	1.001	0.996	0.986	0.969	0.949	0.926	0.901	0.876	0.851	0.829	0.653	0.409	0.197	0.132	0.085	0.048	0.021
8.00	0.06800	0.998	0.989	0.973	0.952	0.928	0.901	0.874	0.847	0.664	0.454	0.234	0.165	0.120	0.084	0.056	0.033	0.015
16.00	0.03689	0.997	0.985	0.966	0.942	0.915	0.886	0.856	0.675	0.476	0.272	0.178	0.134	0.099	0.071	0.048	0.029	0.013
32.00	0.01926	0.996	0.983	0.962	0.937	0.908	0.877	0.774	0.584	0.388	0.210	0.161	0.122	0.091	0.066	0.045	0.027	0.012
64.00	0.00985	0.995	0.981	0.960	0.934	0.904	0.872	0.730	0.540	0.346	0.199	0.153	0.117	0.088	0.064	0.043	0.026	0.012
128.00	0.00498	0.995	0.981	0.959	0.932	0.901	0.869	0.708	0.518	0.325	0.194	0.149	0.114	0.086	0.062	0.043	0.026	0.012
256.00	0.00251	0.995	0.980	0.959	0.931	0.900	0.867	0.697	0.508	0.315	0.192	0.148	0.113	0.085	0.062	0.042	0.026	0.012
512.00	0.00126	0.995	0.980	0.958	0.931	0.900	0.867	0.691	0.502	0.310	0.190	0.147	0.113	0.085	0.062	0.042	0.026	0.012

(d-6) Wall half-angle, 45°

2.50	0.13987	1.004	1.005	1.001	0.994	0.983	0.969	0.951	0.931	0.907	0.881	0.853	0.823	0.791	0.759	0.727	0.695	0.664
4.00	0.10466	1.002	0.999	0.991	0.978	0.961	0.940	0.915	0.888	0.858	0.826	0.793	0.761	0.730	0.702	0.301	0.062	0.020
8.00	0.06207	0.999	0.991	0.977	0.957	0.932	0.903	0.871	0.836	0.800	0.762	0.724	0.556	0.210	0.079	0.046	0.024	0.010
16.00	0.03409	0.997	0.986	0.968	0.944	0.914	0.880	0.842	0.802	0.760	0.717	0.494	0.196	0.085	0.055	0.034	0.019	0.008
32.00	0.01791	0.996	0.984	0.963	0.936	0.904	0.866	0.825	0.781	0.736	0.607	0.331	0.107	0.072	0.047	0.030	0.017	0.007
64.00	0.00919	0.996	0.982	0.961	0.932	0.898	0.859	0.816	0.770	0.722	0.526	0.257	0.098	0.067	0.045	0.028	0.016	0.007
128.00	0.00466	0.995	0.981	0.959	0.930	0.895	0.855	0.811	0.764	0.715	0.487	0.222	0.094	0.064	0.043	0.028	0.016	0.007
256.00	0.00234	0.995	0.981	0.959	0.929	0.893	0.852	0.808	0.761	0.711	0.468	0.205	0.092	0.063	0.043	0.027	0.016	0.007
512.00	0.00118	0.995	0.981	0.958	0.928	0.892	0.851	0.807	0.759	0.709	0.459	0.196	0.091	0.063	0.042	0.027	0.016	0.007

(d-7) Wall half-angle, 60°

3.90	0.09472	1.001	0.998	0.992	0.983	0.969	0.953	0.933	0.909	0.883	0.853	0.821	0.786	0.748	0.707	0.665	0.620	0.573
4.00	0.09316	1.001	0.998	0.992	0.982	0.968	0.951	0.931	0.907	0.880	0.850	0.817	0.781	0.743	0.702	0.658	0.613	0.566
8.00	0.05601	0.999	0.992	0.981	0.964	0.942	0.915	0.884	0.849	0.810	0.767	0.722	0.673	0.622	0.569	0.363	0.023	0.006
16.00	0.03104	0.997	0.988	0.972	0.950	0.921	0.888	0.849	0.806	0.759	0.708	0.654	0.597	0.537	0.182	0.025	0.011	0.004
32.00	0.01639	0.996	0.985	0.967	0.941	0.909	0.871	0.828	0.780	0.728	0.672	0.613	0.551	0.346	0.037	0.019	0.009	0.003
64.00	0.00843	0.996	0.984	0.964	0.936	0.902	0.862	0.816	0.766	0.711	0.653	0.591	0.527	0.210	0.031	0.016	0.008	0.003
128.00	0.00428	0.996	0.983	0.962	0.934	0.898	0.857	0.810	0.758	0.702	0.642	0.579	0.514	0.148	0.029	0.016	0.008	0.003
256.00	0.00215	0.996	0.983	0.961	0.932	0.897	0.854	0.807	0.754	0.697	0.637	0.573	0.506	0.118	0.028	0.015	0.008	0.003
512.00	0.00108	0.996	0.982	0.961	0.932	0.896	0.853	0.805	0.752	0.695	0.634	0.570	0.489	0.104	0.028	0.015	0.008	0.003

(d-8) Wall half-angle, 75°

7.90	0.05199	0.998	0.993	0.982	0.968	0.949	0.926	0.899	0.867	0.830	0.790	0.744	0.694	0.639	0.579	0.514	0.444	0.368
8.00	0.05147	0.998	0.992	0.982	0.968	0.949	0.926	0.898	0.866	0.829	0.788	0.742	0.692	0.637	0.576	0.511	0.440	0.364
16.00	0.02864	0.997	0.989	0.975	0.955	0.930	0.899	0.863	0.821	0.774	0.722	0.665	0.603	0.537	0.467	0.392	0.312	0.002
32.00	0.01517	0.997	0.987	0.970	0.947	0.917	0.881	0.840	0.792	0.739	0.681	0.619	0.551	0.480	0.405	0.326	0.007	0.001
64.00	0.00781	0.996	0.985	0.967	0.942	0.910	0.871	0.827	0.776	0.720	0.659	0.593	0.523	0.450	0.373	0.293	0.004	0.001
128.00	0.00397	0.996	0.985	0.966	0.939	0.906	0.866	0.820	0.768	0.710	0.647	0.580	0.509	0.434	0.356	0.276	0.003	0.001
256.00	0.00200	0.996	0.984	0.965	0.938	0.904	0.863	0.816	0.763	0.705	0.641	0.573	0.501	0.426	0.348	0.267	0.003	0.001
512.00	0.00100	0.996	0.984	0.965	0.937	0.903	0.862	0.814	0.761	0.702	0.638	0.570	0.498	0.422	0.344	0.263	0.003	0.001

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(e) Length to inlet width ratio, 4.00

(e-1) Wall half-angle, 0°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.50	0.30124	1.017	1.026	1.029	1.025	1.014	0.998	0.977	0.951	0.921	0.888	0.851	0.811	0.769	0.724	0.676	0.627	0.575
1.00	0.21932	1.006	1.004	0.995	0.980	0.961	0.941	0.821	0.691	0.566	0.477	0.403	0.336	0.272	0.211	0.152	0.096	0.045
2.00	0.14422	1.000	0.994	0.970	0.832	0.687	0.551	0.464	0.397	0.340	0.290	0.244	0.201	0.161	0.124	0.089	0.056	0.027
4.00	0.08846	0.998	0.911	0.756	0.595	0.478	0.404	0.347	0.299	0.257	0.220	0.185	0.153	0.122	0.094	0.068	0.043	0.021
8.00	0.05105	0.953	0.789	0.619	0.476	0.395	0.337	0.290	0.251	0.216	0.185	0.156	0.129	0.103	0.080	0.057	0.037	0.018
16.00	0.02795	0.892	0.718	0.539	0.423	0.353	0.302	0.261	0.226	0.195	0.167	0.141	0.116	0.094	0.072	0.052	0.033	0.016
32.00	0.01473	0.858	0.679	0.496	0.396	0.332	0.285	0.246	0.213	0.184	0.158	0.133	0.110	0.088	0.068	0.049	0.032	0.015
64.00	0.00758	0.840	0.659	0.478	0.383	0.321	0.276	0.238	0.207	0.178	0.153	0.129	0.107	0.086	0.066	0.048	0.031	0.015
128.00	0.00385	0.831	0.648	0.469	0.376	0.316	0.271	0.235	0.203	0.176	0.150	0.127	0.105	0.084	0.065	0.047	0.030	0.014
256.00	0.00194	0.826	0.643	0.465	0.373	0.313	0.269	0.233	0.202	0.174	0.149	0.126	0.104	0.084	0.065	0.047	0.030	0.014
512.00	0.00097	0.824	0.640	0.462	0.371	0.312	0.268	0.232	0.201	0.173	0.148	0.125	0.104	0.083	0.064	0.047	0.030	0.014

(e-2) Wall half-angle, 5°

0.82	0.25652	1.015	1.024	1.025	1.021	1.010	0.994	0.974	0.949	0.920	0.888	0.852	0.814	0.774	0.730	0.685	0.637	0.586
1.00	0.23709	1.012	1.017	1.015	1.007	0.993	0.974	0.951	0.924	0.895	0.864	0.832	0.790	0.657	0.501	0.383	0.264	0.129
2.00	0.16569	1.004	1.000	0.989	0.975	0.959	0.909	0.755	0.590	0.469	0.388	0.321	0.262	0.209	0.159	0.113	0.071	0.033
4.00	0.10489	0.999	0.992	0.983	0.862	0.692	0.520	0.425	0.356	0.301	0.253	0.211	0.172	0.137	0.104	0.075	0.047	0.022
8.00	0.06164	0.998	0.991	0.832	0.652	0.483	0.394	0.331	0.281	0.239	0.202	0.169	0.138	0.110	0.084	0.060	0.038	0.018
16.00	0.03413	0.997	0.905	0.721	0.532	0.411	0.341	0.289	0.246	0.210	0.178	0.149	0.122	0.098	0.075	0.054	0.034	0.016
32.00	0.01810	0.997	0.850	0.661	0.472	0.378	0.315	0.268	0.229	0.196	0.166	0.139	0.114	0.091	0.070	0.050	0.032	0.015
64.00	0.00934	0.996	0.821	0.629	0.449	0.362	0.303	0.258	0.220	0.188	0.160	0.134	0.110	0.088	0.068	0.049	0.031	0.015
128.00	0.00475	0.994	0.807	0.613	0.438	0.354	0.297	0.252	0.216	0.185	0.157	0.131	0.108	0.086	0.066	0.048	0.030	0.015
256.00	0.00240	0.988	0.799	0.605	0.433	0.350	0.293	0.250	0.214	0.183	0.155	0.130	0.107	0.086	0.066	0.047	0.030	0.014
512.00	0.00120	0.984	0.796	0.601	0.430	0.348	0.292	0.249	0.213	0.182	0.155	0.130	0.107	0.085	0.065	0.047	0.030	0.014

(e-3) Wall half-angle, 10°

1.22	0.21322	1.013	1.020	1.021	1.016	1.005	0.990	0.970	0.946	0.918	0.888	0.854	0.818	0.780	0.739	0.696	0.652	0.604
2.00	0.17048	1.007	1.007	1.000	0.988	0.972	0.952	0.931	0.909	0.889	0.778	0.581	0.415	0.319	0.240	0.169	0.104	0.047
4.00	0.11211	1.001	0.995	0.984	0.970	0.956	0.863	0.668	0.469	0.372	0.302	0.245	0.197	0.154	0.116	0.081	0.051	0.024
8.00	0.06722	0.998	0.990	0.978	0.926	0.728	0.521	0.391	0.318	0.263	0.218	0.179	0.144	0.114	0.086	0.061	0.038	0.018
16.00	0.03763	0.997	0.987	0.958	0.757	0.549	0.395	0.320	0.265	0.221	0.184	0.152	0.124	0.098	0.074	0.053	0.033	0.016
32.00	0.02008	0.996	0.986	0.874	0.667	0.454	0.353	0.289	0.241	0.202	0.169	0.140	0.114	0.090	0.069	0.049	0.031	0.015
64.00	0.01040	0.996	0.985	0.830	0.620	0.420	0.334	0.275	0.230	0.193	0.162	0.134	0.109	0.086	0.066	0.047	0.030	0.014
128.00	0.00530	0.995	0.985	0.808	0.596	0.407	0.325	0.268	0.224	0.189	0.158	0.131	0.107	0.085	0.064	0.046	0.029	0.014
256.00	0.00267	0.995	0.985	0.797	0.584	0.400	0.320	0.264	0.222	0.186	0.156	0.129	0.105	0.084	0.064	0.045	0.029	0.014
512.00	0.00134	0.995	0.985	0.791	0.578	0.397	0.318	0.263	0.220	0.185	0.155	0.129	0.105	0.083	0.063	0.045	0.029	0.014

(e-4) Wall half-angle, 20°

1.94	0.15874	1.010	1.015	1.014	1.008	0.997	0.982	0.963	0.940	0.914	0.886	0.855	0.823	0.788	0.753	0.716	0.678	0.639
2.00	0.15675	1.010	1.014	1.013	1.006	0.995	0.980	0.960	0.937	0.912	0.883	0.853	0.820	0.787	0.753	0.718	0.683	0.653
4.00	0.10930	1.003	1.000	0.991	0.977	0.959	0.940	0.920	0.902	0.886	0.720	0.431	0.285	0.207	0.148	0.099	0.059	0.026
8.00	0.06770	0.999	0.991	0.978	0.961	0.943	0.927	0.818	0.557	0.338	0.256	0.198	0.153	0.117	0.086	0.059	0.036	0.016
16.00	0.03856	0.997	0.986	0.971	0.953	0.935	0.749	0.490	0.314	0.243	0.193	0.153	0.120	0.093	0.069	0.048	0.029	0.014
32.00	0.02076	0.996	0.984	0.966	0.947	0.841	0.587	0.347	0.266	0.211	0.169	0.135	0.107	0.083	0.062	0.043	0.027	0.012
64.00	0.01080	0.995	0.982	0.964	0.944	0.761	0.506	0.316	0.246	0.196	0.158	0.127	0.101	0.078	0.059	0.041	0.026	0.012
128.00	0.00552	0.995	0.981	0.962	0.942	0.721	0.465	0.302	0.236	0.190	0.153	0.124	0.098	0.076	0.057	0.040	0.025	0.012
256.00	0.00279	0.995	0.981	0.962	0.941	0.700	0.445	0.296	0.232	0.186	0.151	0.122	0.097	0.075	0.056	0.040	0.025	0.011
512.00	0.00140	0.995	0.980	0.961	0.941	0.690	0.435	0.292	0.230	0.185	0.150	0.121	0.096	0.075	0.056	0.039	0.024	0.011

(e-5) Wall half-angle, 30°

2.82	0.11766	1.007	1.009	1.007	1.000	0.989	0.973	0.955	0.933	0.909	0.882	0.854	0.824	0.794	0.763	0.732	0.702	0.673
4.00	0.09860	1.004	1.003	0.997	0.986	0.971	0.953	0.931	0.908	0.884	0.859	0.836	0.815	0.800	0.562	0.194	0.097	0.037
8.00	0.06305	1.000	0.994	0.981	0.964	0.943	0.921	0.898	0.876	0.856	0.692	0.308	0.188	0.129	0.088	0.057	0.033	0.014
16.00	0.03653	0.998	0.987	0.971	0.950	0.925	0.900	0.876	0.784	0.445	0.224	0.160	0.117	0.085	0.061	0.041	0.024	0.011
32.00	0.01985	0.996	0.984	0.964	0.940	0.914	0.886	0.829	0.505	0.242	0.174	0.130	0.098	0.072	0.052	0.035	0.021	0.010
64.00	0.01038	0.995	0.981	0.961	0.935	0.906	0.877	0.693	0.372	0.211	0.156	0.118	0.090	0.067	0.048	0.033	0.020	0.009
128.00	0.00531	0.995	0.980	0.958	0.932	0.902	0.872	0.626	0.307	0.198	0.148	0.113	0.086	0.065	0.047	0.032	0.019	0.009
256.00	0.00269	0.995	0.980	0.957	0.930	0.900	0.869	0.593	0.275	0.192	0.145	0.110	0.084	0.063	0.046	0.031	0.019	0.009
512.00	0.00135	0.994	0.979	0.957	0.929	0.899	0.867	0.577	0.263	0.190	0.143	0.109	0.084	0.063	0.046	0.031	0.019	0.009

(e-6) Wall half-angle, 45°

4.50	0.07744	1.003	1.002	0.998	0.989	0.977	0.962	0.944	0.922	0.899	0.874	0.847	0.818	0.790	0.761	0.732	0.705	0.680
8.00	0.05440	1.001	0.996	0.986	0.972	0.954	0.932	0.907	0.880	0.851	0.821	0.791	0.763	0.736	0.469	0.082	0.035	0.012
16.00	0.03219	0.998	0.989	0.975	0.954	0.929	0.900	0.868	0.834	0.799	0.764	0.728	0.316	0.093	0.054	0.031	0.017	0.007
32.00	0.01769	0.997	0.985	0.967	0.942	0.912	0.878	0.840	0.801	0.761	0.719	0.284	0.097	0.060	0.038	0.024	0.013	0.006
64.00	0.00930	0.996	0.983	0.962	0.934	0.901	0.864	0.823	0.780	0.736	0.509	0.127	0.079	0.051	0.034	0.021	0.012	0.005
128.00	0.00477	0.995	0.981	0.959	0.930	0.895	0.856	0.813	0.769	0.722	0.382	0.112	0.072	0.048	0.032	0.020	0.011	0.005
256.00	0.00242	0.995	0.981	0.958	0.928	0.892	0.852	0.808	0.762	0.715	0.322	0.106	0.069	0.046	0.031	0.020	0.011	0.005
512.00	0.00122	0.995	0.980	0.957	0.927	0.890	0.850	0.805	0.759	0.711	0.292	0.103	0.067	0.045	0.030	0.019	0.011	0.005

(e-7) Wall half-angle, 60°

7.30	0.05032	1.000	0.997	0.990	0.980	0.966	0.949	0.929	0.906	0.881	0.852	0.821	0.788	0.753	0.716	0.677	0.636	0.594
8.00	0.04739	1.000	0.996	0.989	0.978	0.963	0.945	0.924	0.900	0.872	0.842	0.809	0.774	0.737	0.698	0.657	0.615	0.573
16.00	0.02840	0.998	0.991	0.979	0.961	0.939	0.912	0.881	0.846	0.807	0.765	0.720	0.673	0.623	0.571	0.052	0.014	0.004
32.00	0.01573	0.997	0.987	0.971	0.948	0.920	0.886	0.847	0.804	0.757	0.707	0.654	0.597	0.538	0.042	0.017	0.007	0.002
64.00	0.00831	0.996	0.985	0.966	0.940	0.907	0.869	0.826	0.778	0.727	0.671	0.613	0.552	0.184	0.026	0.012	0.006	0.002
128.00	0.00427	0.996	0.983	0.963	0.935	0.901	0.860	0.814	0.764	0.709	0.651	0.590	0.527	0.048	0.022	0.011	0.005	0.002
256.00	0.00217	0.996	0.983	0.961	0.933	0.897	0.855	0.808	0.756	0.700	0.641	0.579	0.514	0.042	0.020	0.010	0.005	0.002
512.00	0.00109	0.996	0.982	0.961	0.931	0.895	0.853	0.805	0.752	0.696	0.636	0.573	0.501	0.040	0.019	0.010	0.005	0.002

(e-8) Wall half-angle, 75°

15.30	0.02676	0.998	0.992	0.982	0.968	0.949	0.926	0.899	0.867	0.831	0.791	0.746	0.697	0.643	0.584	0.520	0.451	0.377
16.00	0.02582	0.998	0.992	0.982	0.967	0.948	0.924	0.896	0.864	0.827	0.786	0.740	0.690	0.635	0.575	0.510	0.440	0.365
32.00	0.01435	0.997	0.989	0.975	0.955	0.929	0.898	0.862	0.820	0.773	0.721	0.665	0.603	0.537	0.467	0.392	0.313	0.001
64.00	0.00760	0.997	0.987	0.970	0.947	0.917	0.881	0.839	0.792	0.739	0.681	0.618	0.551	0.480	0.405	0.326	0.004	0.001
128.00	0.00391	0.996	0.985	0.967	0.942	0.910	0.871	0.826	0.776	0.720	0.659	0.593	0.523	0.449	0.373	0.293	0.002	0.000
256.00	0.00199	0.996	0.985	0.966	0.939	0.906	0.866	0.819	0.767	0.709	0.647	0.580	0.509	0.434	0.356	0.276	0.002	0.000
512.00	0.00100	0.996	0.984	0.965	0.938	0.904	0.863	0.816	0.763	0.704	0.641	0.573	0.501	0.426	0.348	0.267	0.002	0.000

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(f) Length to inlet width ratio, 8.00

(f-1) Wall half-angle, 0°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.50	0.21073	1.016	1.024	1.025	1.019	1.006	0.988	0.964	0.936	0.903	0.867	0.827	0.784	0.738	0.689	0.638	0.585	0.529
1.00	0.15834	1.006	1.003	0.993	0.977	0.957	0.936	0.745	0.583	0.487	0.413	0.350	0.292	0.237	0.184	0.133	0.084	0.039
2.00	0.10939	1.000	0.994	0.960	0.727	0.546	0.450	0.382	0.327	0.281	0.240	0.202	0.167	0.134	0.103	0.074	0.047	0.022
4.00	0.07141	0.998	0.846	0.582	0.446	0.367	0.312	0.269	0.232	0.200	0.171	0.144	0.119	0.096	0.074	0.053	0.034	0.016
8.00	0.04398	0.915	0.614	0.427	0.341	0.285	0.244	0.211	0.183	0.158	0.135	0.114	0.094	0.076	0.058	0.042	0.027	0.013
16.00	0.02546	0.794	0.489	0.356	0.287	0.242	0.208	0.180	0.156	0.135	0.115	0.097	0.081	0.065	0.050	0.036	0.023	0.011
32.00	0.01396	0.724	0.433	0.320	0.259	0.218	0.188	0.163	0.141	0.122	0.105	0.088	0.073	0.059	0.045	0.033	0.021	0.010
64.00	0.00736	0.686	0.406	0.301	0.244	0.206	0.177	0.154	0.134	0.116	0.099	0.084	0.069	0.056	0.043	0.031	0.020	0.010
128.00	0.00379	0.666	0.392	0.291	0.237	0.200	0.172	0.149	0.130	0.112	0.096	0.081	0.067	0.054	0.042	0.030	0.019	0.009
256.00	0.00192	0.656	0.385	0.287	0.233	0.197	0.169	0.147	0.128	0.110	0.095	0.080	0.066	0.053	0.041	0.030	0.019	0.009
512.00	0.00097	0.651	0.382	0.284	0.231	0.195	0.168	0.146	0.127	0.109	0.094	0.079	0.066	0.053	0.041	0.030	0.019	0.009

(f-2) Wall half-angle, 5°

1.14	0.16675	1.014	1.020	1.020	1.013	1.001	0.983	0.960	0.933	0.901	0.866	0.828	0.786	0.742	0.695	0.646	0.594	0.538
2.00	0.13277	1.007	1.005	0.997	0.983	0.965	0.944	0.922	0.867	0.629	0.480	0.390	0.320	0.257	0.198	0.143	0.090	0.041
4.00	0.09144	1.001	0.995	0.984	0.973	0.757	0.525	0.417	0.345	0.290	0.244	0.203	0.166	0.132	0.101	0.072	0.045	0.021
8.00	0.05820	0.998	0.992	0.853	0.555	0.416	0.338	0.284	0.241	0.205	0.173	0.144	0.118	0.094	0.072	0.052	0.033	0.016
16.00	0.03447	0.997	0.907	0.582	0.405	0.323	0.268	0.227	0.194	0.166	0.141	0.118	0.097	0.077	0.059	0.042	0.027	0.013
32.00	0.01919	0.997	0.768	0.466	0.346	0.280	0.235	0.200	0.171	0.146	0.124	0.104	0.086	0.068	0.053	0.038	0.024	0.011
64.00	0.01021	0.997	0.692	0.422	0.319	0.259	0.218	0.186	0.159	0.136	0.116	0.097	0.080	0.064	0.049	0.035	0.023	0.011
128.00	0.00528	0.997	0.653	0.401	0.305	0.249	0.210	0.179	0.154	0.131	0.112	0.094	0.077	0.062	0.047	0.034	0.022	0.010
256.00	0.00269	0.985	0.633	0.391	0.298	0.244	0.205	0.175	0.151	0.129	0.110	0.092	0.076	0.061	0.047	0.034	0.021	0.010
512.00	0.00136	0.976	0.623	0.386	0.295	0.241	0.203	0.174	0.149	0.128	0.109	0.091	0.075	0.060	0.046	0.033	0.021	0.010

(f-3) Wall half-angle, 10°

1.94	0.13074	1.012	1.017	1.015	1.008	0.996	0.978	0.956	0.930	0.900	0.867	0.831	0.793	0.751	0.708	0.661	0.612	0.560
2.00	0.12934	1.011	1.016	1.014	1.006	0.994	0.976	0.953	0.927	0.897	0.864	0.829	0.791	0.750	0.708	0.663	0.617	0.434
4.00	0.09489	1.004	1.001	0.991	0.977	0.961	0.943	0.926	0.836	0.522	0.387	0.305	0.242	0.189	0.142	0.100	0.062	0.028
8.00	0.06251	1.000	0.993	0.982	0.970	0.897	0.555	0.394	0.312	0.254	0.209	0.171	0.138	0.108	0.082	0.058	0.036	0.017
16.00	0.03777	0.998	0.989	0.980	0.769	0.457	0.342	0.274	0.226	0.188	0.157	0.129	0.105	0.083	0.063	0.045	0.028	0.013
32.00	0.02127	0.996	0.987	0.881	0.514	0.356	0.280	0.229	0.191	0.160	0.134	0.111	0.090	0.071	0.054	0.039	0.024	0.012
64.00	0.01139	0.996	0.986	0.754	0.430	0.316	0.252	0.208	0.175	0.147	0.123	0.102	0.083	0.066	0.050	0.036	0.023	0.011
128.00	0.00591	0.995	0.985	0.688	0.399	0.298	0.239	0.198	0.167	0.140	0.118	0.098	0.080	0.063	0.048	0.034	0.022	0.010
256.00	0.00301	0.995	0.985	0.655	0.384	0.289	0.233	0.193	0.163	0.137	0.115	0.096	0.078	0.062	0.047	0.034	0.021	0.010
512.00	0.00152	0.995	0.985	0.638	0.377	0.285	0.230	0.191	0.161	0.135	0.114	0.094	0.077	0.061	0.047	0.033	0.021	0.010

(f-4) Wall half-angle, 20°

3.38	0.09128	1.008	1.011	1.008	1.000	0.988	0.971	0.950	0.926	0.899	0.869	0.837	0.804	0.768	0.731	0.693	0.653	0.611
4.00	0.08522	1.007	1.008	1.003	0.994	0.979	0.961	0.940	0.916	0.890	0.862	0.834	0.806	0.779	0.755	0.444	0.212	0.090
8.00	0.05927	1.002	0.997	0.986	0.971	0.955	0.937	0.920	0.907	0.737	0.361	0.252	0.186	0.138	0.100	0.068	0.041	0.018
16.00	0.03690	0.998	0.990	0.976	0.960	0.945	0.932	0.590	0.322	0.236	0.182	0.143	0.111	0.085	0.063	0.043	0.027	0.012
32.00	0.02113	0.997	0.985	0.970	0.953	0.938	0.532	0.304	0.226	0.177	0.141	0.112	0.089	0.068	0.051	0.035	0.022	0.010
64.00	0.01142	0.995	0.983	0.966	0.948	0.729	0.355	0.251	0.194	0.154	0.124	0.100	0.079	0.061	0.046	0.032	0.020	0.009
128.00	0.00595	0.995	0.981	0.963	0.944	0.601	0.315	0.230	0.180	0.144	0.117	0.094	0.075	0.058	0.044	0.031	0.019	0.009
256.00	0.00304	0.994	0.980	0.961	0.942	0.537	0.298	0.221	0.173	0.139	0.113	0.091	0.073	0.057	0.042	0.030	0.019	0.009
512.00	0.00154	0.994	0.980	0.961	0.941	0.505	0.290	0.216	0.170	0.137	0.111	0.090	0.072	0.056	0.042	0.029	0.018	0.009

(f-5) Wall half-angle, 30°

5.14	0.06474	1.005	1.006	1.002	0.993	0.980	0.964	0.944	0.922	0.897	0.870	0.842	0.813	0.783	0.753	0.723	0.693	0.663
8.00	0.05197	1.003	1.000	0.992	0.979	0.963	0.944	0.923	0.901	0.879	0.858	0.839	0.825	0.634	0.194	0.107	0.057	0.022
16.00	0.03329	0.999	0.992	0.979	0.961	0.941	0.920	0.899	0.880	0.864	0.367	0.191	0.128	0.089	0.062	0.040	0.023	0.010
32.00	0.01937	0.997	0.986	0.969	0.948	0.925	0.901	0.879	0.639	0.239	0.159	0.115	0.084	0.062	0.044	0.029	0.018	0.008
64.00	0.01055	0.996	0.983	0.963	0.939	0.913	0.887	0.763	0.269	0.174	0.126	0.094	0.071	0.053	0.038	0.026	0.016	0.007
128.00	0.00553	0.995	0.980	0.959	0.933	0.905	0.877	0.536	0.223	0.153	0.113	0.086	0.065	0.049	0.035	0.024	0.015	0.007
256.00	0.00283	0.995	0.979	0.957	0.930	0.901	0.872	0.426	0.205	0.144	0.108	0.082	0.063	0.047	0.034	0.023	0.014	0.006
512.00	0.00143	0.994	0.979	0.956	0.928	0.898	0.869	0.371	0.197	0.140	0.105	0.080	0.062	0.046	0.034	0.023	0.014	0.006

(f-6) Wall half-angle, 45°

8.50	0.04092	1.002	1.000	0.994	0.985	0.972	0.956	0.937	0.916	0.893	0.868	0.842	0.816	0.789	0.763	0.737	0.713	0.692
16.00	0.02785	1.000	0.994	0.984	0.969	0.950	0.928	0.904	0.877	0.850	0.822	0.794	0.768	0.744	0.128	0.050	0.022	0.008
32.00	0.01650	0.998	0.988	0.973	0.952	0.927	0.898	0.867	0.834	0.801	0.767	0.733	0.124	0.062	0.036	0.021	0.011	0.005
64.00	0.00908	0.996	0.984	0.965	0.940	0.910	0.876	0.840	0.801	0.762	0.722	0.124	0.067	0.042	0.026	0.016	0.009	0.004
128.00	0.00478	0.996	0.982	0.961	0.933	0.900	0.862	0.822	0.780	0.737	0.316	0.090	0.055	0.036	0.023	0.015	0.008	0.004
256.00	0.00246	0.995	0.981	0.958	0.929	0.893	0.854	0.812	0.768	0.723	0.151	0.079	0.050	0.033	0.022	0.014	0.008	0.003
512.00	0.00125	0.995	0.980	0.957	0.926	0.890	0.850	0.806	0.761	0.715	0.136	0.075	0.048	0.032	0.021	0.014	0.008	0.003

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(g) Length to inlet width ratio, 0.25

(g-1) Wall half-angle, -5°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.48	0.64201	1.007	1.011	1.011	1.008	1.002	0.993	0.980	0.965	0.947	0.926	0.903	0.877	0.850	0.821	0.790	0.758	0.725
0.50	0.62935	1.007	1.010	1.010	1.006	0.999	0.989	0.976	0.960	0.941	0.919	0.896	0.870	0.842	0.813	0.779	0.737	0.651
1.00	0.40463	1.000	0.996	0.986	0.972	0.953	0.922	0.886	0.844	0.794	0.737	0.671	0.594	0.506	0.407	0.295	0.173	0.070
2.00	0.22586	0.997	0.987	0.963	0.933	0.897	0.854	0.804	0.749	0.687	0.618	0.544	0.464	0.379	0.289	0.195	0.105	0.050
4.00	0.11810	0.991	0.971	0.944	0.910	0.870	0.823	0.770	0.711	0.646	0.576	0.501	0.422	0.340	0.254	0.165	0.095	0.046
8.00	0.05989	0.989	0.968	0.939	0.904	0.862	0.814	0.759	0.699	0.633	0.563	0.488	0.409	0.326	0.242	0.155	0.092	0.044
16.00	0.02999	0.992	0.970	0.942	0.906	0.863	0.814	0.759	0.698	0.631	0.560	0.484	0.405	0.323	0.238	0.151	0.092	0.044
32.00	0.01500	0.994	0.972	0.943	0.907	0.864	0.814	0.759	0.697	0.631	0.559	0.483	0.404	0.321	0.236	0.149	0.092	0.044
64.00	0.00750	0.994	0.973	0.944	0.908	0.864	0.815	0.759	0.697	0.630	0.559	0.483	0.403	0.320	0.235	0.148	0.091	0.044
128.00	0.00375	0.995	0.973	0.944	0.908	0.865	0.815	0.759	0.697	0.630	0.558	0.482	0.403	0.320	0.234	0.147	0.091	0.044
256.00	0.00187	0.995	0.973	0.944	0.908	0.865	0.815	0.759	0.697	0.630	0.558	0.482	0.402	0.320	0.234	0.147	0.091	0.044
512.00	0.00094	0.995	0.973	0.944	0.908	0.865	0.815	0.759	0.697	0.630	0.558	0.482	0.402	0.319	0.234	0.147	0.091	0.044

(g-2) Wall half-angle, -10°

0.45	0.65524	1.007	1.010	1.010	1.007	1.000	0.990	0.977	0.960	0.941	0.920	0.896	0.870	0.841	0.812	0.782	0.751	0.719
0.50	0.62530	1.006	1.008	1.007	1.002	0.993	0.982	0.967	0.949	0.928	0.906	0.881	0.853	0.822	0.785	0.737	0.659	0.474
1.00	0.39693	1.000	0.994	0.983	0.964	0.938	0.907	0.870	0.827	0.776	0.718	0.651	0.575	0.489	0.392	0.284	0.168	0.072
2.00	0.21987	0.993	0.976	0.952	0.922	0.886	0.844	0.795	0.740	0.679	0.612	0.538	0.460	0.376	0.289	0.197	0.112	0.054
4.00	0.11302	0.994	0.975	0.948	0.914	0.874	0.828	0.775	0.716	0.652	0.582	0.508	0.429	0.347	0.261	0.173	0.104	0.050
8.00	0.05678	0.996	0.979	0.952	0.917	0.875	0.827	0.772	0.712	0.646	0.575	0.500	0.420	0.338	0.252	0.165	0.102	0.049
16.00	0.02843	0.996	0.982	0.954	0.919	0.876	0.827	0.772	0.711	0.644	0.573	0.497	0.417	0.334	0.249	0.161	0.101	0.049
32.00	0.01422	0.996	0.984	0.955	0.920	0.877	0.828	0.772	0.711	0.644	0.572	0.496	0.416	0.333	0.247	0.160	0.101	0.049
64.00	0.00711	0.996	0.984	0.956	0.920	0.877	0.828	0.772	0.711	0.644	0.572	0.496	0.416	0.332	0.247	0.159	0.101	0.049
128.00	0.00355	0.996	0.985	0.956	0.920	0.878	0.828	0.772	0.711	0.644	0.572	0.495	0.415	0.332	0.246	0.159	0.101	0.049
256.00	0.00178	0.996	0.985	0.956	0.921	0.878	0.828	0.772	0.711	0.644	0.572	0.495	0.415	0.332	0.246	0.158	0.101	0.049
512.00	0.00089	0.996	0.985	0.957	0.921	0.878	0.828	0.772	0.711	0.644	0.572	0.495	0.415	0.332	0.246	0.158	0.101	0.049

(g-3) Wall half-angle, -20°

0.41	0.67487	1.006	1.008	1.007	1.002	0.993	0.981	0.966	0.948	0.926	0.902	0.880	0.856	0.830	0.803	0.775	0.745	0.713
0.50	0.60929	1.004	1.003	0.999	0.990	0.978	0.963	0.946	0.925	0.903	0.876	0.846	0.810	0.766	0.708	0.626	0.494	0.271
1.00	0.37688	0.995	0.983	0.966	0.944	0.917	0.884	0.846	0.801	0.750	0.690	0.623	0.548	0.464	0.371	0.270	0.162	0.075
2.00	0.20082	0.997	0.985	0.961	0.931	0.895	0.852	0.803	0.747	0.686	0.619	0.546	0.467	0.384	0.297	0.207	0.126	0.061
4.00	0.10197	0.996	0.985	0.966	0.933	0.893	0.846	0.793	0.734	0.670	0.600	0.525	0.446	0.363	0.278	0.189	0.119	0.058
8.00	0.05118	0.996	0.985	0.966	0.935	0.894	0.846	0.792	0.732	0.666	0.595	0.519	0.440	0.357	0.271	0.183	0.117	0.057
16.00	0.02562	0.996	0.985	0.966	0.937	0.895	0.847	0.792	0.731	0.665	0.594	0.517	0.438	0.354	0.268	0.180	0.117	0.057
32.00	0.01281	0.996	0.985	0.966	0.938	0.896	0.848	0.793	0.731	0.665	0.593	0.517	0.437	0.353	0.267	0.179	0.117	0.057
64.00	0.00641	0.996	0.985	0.966	0.939	0.897	0.848	0.793	0.732	0.665	0.593	0.517	0.436	0.353	0.266	0.179	0.117	0.057
128.00	0.00320	0.996	0.985	0.966	0.939	0.897	0.848	0.793	0.732	0.665	0.593	0.516	0.436	0.352	0.266	0.179	0.116	0.057
256.00	0.00160	0.996	0.985	0.966	0.939	0.897	0.848	0.793	0.732	0.665	0.593	0.516	0.436	0.352	0.266	0.179	0.116	0.057
512.00	0.00080	0.996	0.985	0.966	0.939	0.897	0.848	0.793	0.732	0.665	0.593	0.516	0.436	0.352	0.266	0.179	0.116	0.057

(g-4) Wall half-angle, -30°

0.35	0.69157	1.004	1.004	1.000	0.992	0.980	0.964	0.949	0.933	0.915	0.895	0.874	0.850	0.825	0.799	0.771	0.742	0.711
0.50	0.57356	0.999	0.994	0.985	0.973	0.958	0.941	0.920	0.896	0.867	0.833	0.793	0.743	0.681	0.601	0.494	0.351	0.167
1.00	0.33454	0.997	0.989	0.973	0.950	0.921	0.886	0.844	0.797	0.742	0.681	0.612	0.535	0.452	0.361	0.263	0.163	0.079
2.00	0.17477	0.997	0.986	0.969	0.945	0.909	0.866	0.816	0.760	0.698	0.630	0.557	0.479	0.396	0.309	0.219	0.140	0.068
4.00	0.08840	0.996	0.985	0.967	0.941	0.908	0.863	0.810	0.752	0.687	0.617	0.542	0.463	0.380	0.295	0.206	0.134	0.066
8.00	0.04433	0.996	0.985	0.966	0.940	0.907	0.864	0.810	0.750	0.685	0.614	0.539	0.459	0.376	0.290	0.203	0.133	0.065
16.00	0.02218	0.996	0.985	0.966	0.940	0.906	0.865	0.811	0.750	0.684	0.613	0.537	0.457	0.374	0.288	0.203	0.132	0.065
32.00	0.01109	0.996	0.985	0.966	0.940	0.906	0.865	0.811	0.751	0.685	0.613	0.537	0.457	0.373	0.287	0.202	0.132	0.065
64.00	0.00555	0.996	0.985	0.966	0.940	0.906	0.866	0.811	0.751	0.685	0.613	0.537	0.457	0.373	0.287	0.202	0.132	0.065
128.00	0.00277	0.996	0.985	0.966	0.940	0.906	0.866	0.812	0.751	0.685	0.613	0.537	0.457	0.373	0.286	0.202	0.132	0.065
256.00	0.00139	0.996	0.985	0.966	0.940	0.906	0.866	0.812	0.751	0.685	0.613	0.537	0.457	0.373	0.286	0.202	0.132	0.065
512.00	0.00069	0.996	0.985	0.966	0.940	0.906	0.866	0.812	0.751	0.685	0.613	0.537	0.457	0.373	0.286	0.202	0.132	0.065

(g-5) Wall half-angle, -45°

0.25	0.70711	0.998	0.994	0.988	0.979	0.970	0.958	0.944	0.929	0.911	0.892	0.872	0.849	0.825	0.800	0.773	0.744	0.714
0.50	0.44721	0.998	0.992	0.982	0.968	0.948	0.922	0.891	0.853	0.809	0.757	0.697	0.626	0.545	0.451	0.346	0.228	0.112
1.00	0.24254	0.997	0.987	0.971	0.949	0.920	0.885	0.843	0.790	0.732	0.667	0.595	0.518	0.435	0.348	0.256	0.168	0.082
2.00	0.12403	0.996	0.985	0.967	0.942	0.910	0.871	0.825	0.773	0.711	0.642	0.569	0.491	0.409	0.323	0.236	0.155	0.076
4.00	0.06238	0.996	0.985	0.966	0.940	0.907	0.867	0.821	0.768	0.706	0.637	0.563	0.484	0.401	0.316	0.232	0.152	0.075
8.00	0.03123	0.996	0.985	0.966	0.940	0.907	0.866	0.820	0.767	0.706	0.636	0.561	0.482	0.399	0.313	0.230	0.152	0.075
16.00	0.01562	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.706	0.636	0.561	0.482	0.399	0.313	0.230	0.151	0.075
32.00	0.00781	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.636	0.561	0.482	0.398	0.312	0.230	0.151	0.075
64.00	0.00391	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.636	0.561	0.482	0.398	0.312	0.230	0.151	0.075
128.00	0.00195	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.637	0.561	0.482	0.398	0.312	0.230	0.151	0.075
256.00	0.00098	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.637	0.561	0.482	0.398	0.312	0.230	0.151	0.075
512.00	0.00049	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.637	0.561	0.482	0.398	0.312	0.230	0.151	0.075

(g-6) Wall half-angle, -60°

0.08	0.70711	0.999	0.996	0.991	0.985	0.976	0.966	0.953	0.938	0.921	0.903	0.883	0.861	0.838	0.813	0.786	0.758	0.729
0.25	0.28735	0.997	0.988	0.973	0.953	0.925	0.892	0.852	0.806	0.752	0.692	0.623	0.548	0.465	0.377	0.285	0.190	0.094
0.50	0.14834	0.996	0.986	0.968	0.943	0.912	0.873	0.828	0.777	0.719	0.655	0.587	0.510	0.429	0.344	0.258	0.171	0.085
1.00	0.07479	0.996	0.985	0.966	0.941	0.908	0.868	0.821	0.769	0.710	0.646	0.577	0.501	0.420	0.336	0.251	0.166	0.083
2.00	0.03747	0.996	0.985	0.966	0.940	0.907	0.866	0.820	0.767	0.708	0.644	0.574	0.499	0.418	0.334	0.249	0.165	0.082
4.00	0.01875	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.499	0.417	0.333	0.249	0.165	0.082
8.00	0.00937	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.499	0.417	0.333	0.249	0.165	0.082
16.00	0.00469	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.499	0.417	0.333	0.249	0.165	0.082
32.00	0.00234	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.499	0.417	0.333	0.249	0.165	0.082
64.00	0.00117	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.499	0.417	0.333	0.249	0.165	0.082
128.00	0.00059	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.499	0.417	0.333	0.249	0.165	0.082
256.00	0.00029	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.500	0.417	0.333	0.249	0.165	0.082
512.00	0.00015	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766	0.707	0.643	0.574	0.500	0.417	0.333	0.249	0.165	0.082

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(h) Length to inlet width ratio, 0.50

(h-1) Wall half-angle, -5°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.46	0.59356	1.012	1.019	1.021	1.020	1.014	1.004	0.990	0.972	0.952	0.928	0.902	0.873	0.842	0.810	0.775	0.739	0.703
0.50	0.57057	1.010	1.016	1.017	1.014	1.006	0.994	0.978	0.959	0.937	0.912	0.885	0.856	0.823	0.783	0.732	0.655	0.467
1.00	0.37105	1.002	0.997	0.987	0.973	0.949	0.911	0.868	0.817	0.760	0.694	0.619	0.534	0.438	0.331	0.214	0.136	0.064
2.00	0.21137	0.998	0.985	0.953	0.915	0.870	0.820	0.763	0.700	0.630	0.555	0.474	0.387	0.296	0.210	0.151	0.096	0.046
4.00	0.11252	0.985	0.956	0.920	0.878	0.829	0.774	0.713	0.647	0.575	0.498	0.417	0.333	0.245	0.186	0.134	0.086	0.041
8.00	0.05741	0.981	0.951	0.913	0.868	0.817	0.760	0.697	0.629	0.556	0.479	0.397	0.312	0.232	0.179	0.129	0.083	0.040
16.00	0.02874	0.988	0.956	0.917	0.871	0.819	0.760	0.696	0.627	0.552	0.473	0.391	0.306	0.230	0.178	0.128	0.082	0.040
32.00	0.01437	0.991	0.959	0.919	0.873	0.820	0.761	0.696	0.625	0.550	0.471	0.388	0.302	0.229	0.177	0.128	0.082	0.039
64.00	0.00719	0.993	0.960	0.921	0.874	0.821	0.761	0.696	0.625	0.550	0.470	0.387	0.301	0.229	0.177	0.128	0.082	0.039
128.00	0.00359	0.994	0.961	0.921	0.874	0.821	0.761	0.696	0.625	0.549	0.470	0.386	0.300	0.228	0.177	0.128	0.082	0.039
256.00	0.00180	0.994	0.961	0.921	0.875	0.821	0.761	0.696	0.625	0.549	0.469	0.386	0.299	0.228	0.177	0.128	0.082	0.039
512.00	0.00090	0.994	0.962	0.922	0.875	0.821	0.761	0.696	0.625	0.549	0.469	0.386	0.299	0.228	0.177	0.128	0.082	0.039

(h-2) Wall half-angle, -10°

0.41	0.61659	1.012	1.019	1.021	1.018	1.011	1.000	0.985	0.967	0.945	0.920	0.892	0.862	0.830	0.796	0.763	0.729	0.694
0.50	0.55911	1.008	1.012	1.010	1.003	0.992	0.977	0.958	0.936	0.910	0.879	0.844	0.803	0.753	0.688	0.596	0.451	0.215
1.00	0.35430	1.000	0.994	0.979	0.950	0.917	0.877	0.832	0.780	0.722	0.655	0.580	0.497	0.404	0.302	0.209	0.134	0.063
2.00	0.19898	0.986	0.960	0.929	0.891	0.848	0.798	0.742	0.681	0.613	0.540	0.461	0.378	0.290	0.217	0.157	0.101	0.048
4.00	0.10197	0.954	0.965	0.930	0.888	0.839	0.784	0.723	0.657	0.585	0.509	0.428	0.343	0.261	0.203	0.147	0.095	0.045
8.00	0.05118	0.996	0.975	0.937	0.892	0.841	0.784	0.720	0.651	0.577	0.499	0.416	0.331	0.256	0.199	0.144	0.093	0.045
16.00	0.02562	0.996	0.980	0.941	0.896	0.843	0.784	0.720	0.650	0.574	0.495	0.411	0.325	0.254	0.198	0.144	0.093	0.045
32.00	0.01281	0.996	0.983	0.944	0.897	0.844	0.785	0.720	0.649	0.573	0.493	0.409	0.322	0.254	0.197	0.143	0.092	0.045
64.00	0.00641	0.996	0.984	0.945	0.898	0.845	0.785	0.720	0.649	0.573	0.492	0.408	0.321	0.253	0.197	0.143	0.092	0.045
128.00	0.00320	0.996	0.985	0.945	0.899	0.845	0.786	0.720	0.649	0.572	0.492	0.407	0.320	0.253	0.197	0.143	0.092	0.045
256.00	0.00160	0.996	0.985	0.946	0.899	0.846	0.786	0.720	0.648	0.572	0.491	0.407	0.320	0.253	0.197	0.143	0.092	0.045
512.00	0.00080	0.996	0.985	0.946	0.899	0.846	0.786	0.720	0.648	0.572	0.491	0.407	0.319	0.253	0.197	0.143	0.092	0.045

(h-3) Wall half-angle, -20°

0.32	0.65156	1.011	1.016	1.017	1.012	1.002	0.988	0.970	0.948	0.923	0.894	0.869	0.842	0.814	0.784	0.753	0.720	0.686
0.50	0.51191	1.003	0.999	0.990	0.974	0.953	0.929	0.900	0.867	0.829	0.784	0.731	0.667	0.589	0.493	0.375	0.242	0.117
1.00	0.30478	0.991	0.971	0.946	0.915	0.879	0.837	0.789	0.735	0.674	0.606	0.532	0.451	0.363	0.277	0.203	0.131	0.063
2.00	0.15799	0.996	0.986	0.957	0.918	0.873	0.822	0.764	0.701	0.631	0.557	0.477	0.393	0.311	0.243	0.178	0.115	0.056
4.00	0.07975	0.996	0.985	0.967	0.926	0.876	0.821	0.759	0.691	0.618	0.540	0.458	0.372	0.300	0.235	0.172	0.111	0.054
8.00	0.03997	0.996	0.985	0.966	0.931	0.880	0.822	0.759	0.689	0.614	0.534	0.450	0.364	0.297	0.232	0.170	0.110	0.053
16.00	0.02000	0.996	0.985	0.966	0.935	0.883	0.824	0.759	0.688	0.612	0.532	0.447	0.362	0.296	0.231	0.169	0.110	0.053
32.00	0.01000	0.996	0.985	0.966	0.937	0.884	0.825	0.760	0.688	0.612	0.531	0.445	0.361	0.295	0.231	0.169	0.110	0.053
64.00	0.00500	0.996	0.985	0.966	0.938	0.885	0.826	0.760	0.688	0.611	0.530	0.444	0.361	0.295	0.231	0.169	0.110	0.053
128.00	0.00250	0.996	0.985	0.966	0.938	0.885	0.826	0.760	0.688	0.611	0.530	0.444	0.361	0.295	0.231	0.169	0.110	0.053
256.00	0.00125	0.996	0.985	0.966	0.939	0.886	0.826	0.760	0.688	0.611	0.530	0.444	0.361	0.295	0.231	0.169	0.110	0.053
512.00	0.00062	0.996	0.985	0.966	0.939	0.886	0.826	0.760	0.688	0.611	0.530	0.444	0.361	0.295	0.231	0.169	0.110	0.053

(h-4) Wall half-angle, -30°

0.21	0.68154	1.008	1.010	1.006	0.996	0.980	0.961	0.944	0.926	0.906	0.884	0.861	0.835	0.809	0.781	0.751	0.720	0.688
0.25	0.62606	1.004	1.001	0.992	0.979	0.965	0.949	0.931	0.910	0.886	0.860	0.830	0.795	0.754	0.700	0.625	0.502	0.286
0.50	0.38723	0.998	0.989	0.969	0.945	0.915	0.880	0.840	0.793	0.739	0.678	0.609	0.531	0.445	0.352	0.262	0.171	0.083
1.00	0.20552	0.997	0.987	0.970	0.946	0.904	0.857	0.803	0.743	0.677	0.604	0.527	0.444	0.363	0.287	0.211	0.138	0.067
2.00	0.10443	0.996	0.985	0.967	0.941	0.909	0.855	0.796	0.730	0.658	0.582	0.500	0.419	0.344	0.271	0.200	0.130	0.064
4.00	0.05243	0.996	0.985	0.966	0.940	0.907	0.859	0.796	0.728	0.653	0.574	0.491	0.412	0.339	0.267	0.197	0.128	0.063
8.00	0.02624	0.996	0.985	0.966	0.940	0.906	0.862	0.798	0.728	0.652	0.571	0.486	0.410	0.337	0.266	0.196	0.128	0.062
16.00	0.01312	0.996	0.985	0.966	0.940	0.906	0.864	0.799	0.728	0.652	0.570	0.484	0.410	0.337	0.265	0.195	0.128	0.062
32.00	0.00656	0.996	0.985	0.966	0.940	0.906	0.865	0.800	0.729	0.652	0.570	0.484	0.409	0.336	0.265	0.195	0.128	0.062
64.00	0.00328	0.996	0.985	0.966	0.940	0.906	0.866	0.800	0.729	0.652	0.570	0.483	0.409	0.336	0.265	0.195	0.128	0.062
128.00	0.00164	0.996	0.985	0.966	0.940	0.906	0.866	0.801	0.729	0.652	0.569	0.483	0.409	0.336	0.265	0.195	0.128	0.062
256.00	0.00082	0.996	0.985	0.966	0.940	0.906	0.866	0.801	0.729	0.652	0.569	0.483	0.409	0.336	0.265	0.195	0.128	0.062
512.00	0.00041	0.996	0.985	0.966	0.940	0.906	0.866	0.801	0.729	0.652	0.569	0.483	0.409	0.336	0.265	0.195	0.128	0.062

(i) Length to inlet width ratio, 1.00

(i-1) Wall half-angle, -5°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.42	0.52572	1.016	1.026	1.030	1.028	1.021	1.009	0.993	0.972	0.948	0.921	0.890	0.857	0.822	0.784	0.745	0.704	0.661
0.50	0.48533	1.013	1.019	1.019	1.013	1.002	0.986	0.966	0.943	0.916	0.888	0.850	0.802	0.744	0.672	0.573	0.412	0.212
1.00	0.31894	1.003	0.998	0.987	0.972	0.927	0.875	0.816	0.750	0.677	0.595	0.504	0.403	0.323	0.250	0.180	0.114	0.054
2.00	0.18672	0.998	0.973	0.925	0.871	0.811	0.745	0.673	0.595	0.511	0.421	0.349	0.289	0.232	0.178	0.128	0.082	0.039
4.00	0.10223	0.970	0.923	0.870	0.810	0.744	0.673	0.596	0.515	0.429	0.357	0.302	0.250	0.201	0.155	0.112	0.072	0.034
8.00	0.05243	0.969	0.918	0.860	0.796	0.727	0.651	0.571	0.486	0.398	0.342	0.289	0.239	0.192	0.149	0.107	0.069	0.033
16.00	0.02624	0.980	0.926	0.866	0.799	0.726	0.648	0.565	0.477	0.394	0.338	0.286	0.237	0.191	0.147	0.107	0.068	0.033
32.00	0.01312	0.986	0.931	0.869	0.801	0.726	0.647	0.562	0.472	0.392	0.337	0.285	0.236	0.190	0.147	0.106	0.068	0.033
64.00	0.00656	0.989	0.934	0.871	0.802	0.727	0.646	0.560	0.470	0.392	0.336	0.284	0.236	0.190	0.147	0.106	0.068	0.033
128.00	0.00328	0.991	0.935	0.872	0.802	0.727	0.645	0.559	0.469	0.391	0.336	0.284	0.236	0.190	0.147	0.106	0.068	0.033
256.00	0.00164	0.992	0.935	0.872	0.803	0.727	0.645	0.559	0.468	0.391	0.336	0.284	0.235	0.190	0.147	0.106	0.068	0.033
512.00	0.00082	0.992	0.936	0.873	0.803	0.727	0.645	0.559	0.468	0.391	0.336	0.284	0.235	0.190	0.147	0.106	0.068	0.033

(i-2) Wall half-angle, -10°

0.32	0.56301	1.017	1.026	1.030	1.028	1.020	1.007	0.989	0.967	0.941	0.912	0.879	0.844	0.807	0.768	0.731	0.692	0.652
0.50	0.44936	1.008	1.008	1.001	0.988	0.971	0.946	0.908	0.864	0.815	0.759	0.693	0.616	0.523	0.415	0.312	0.205	0.098
1.00	0.28081	0.999	0.982	0.943	0.899	0.850	0.794	0.732	0.664	0.589	0.507	0.424	0.355	0.289	0.224	0.162	0.104	0.050
2.00	0.15799	0.972	0.930	0.882	0.828	0.768	0.703	0.632	0.555	0.474	0.405	0.344	0.287	0.232	0.180	0.131	0.084	0.040
4.00	0.07975	0.996	0.952	0.897	0.834	0.766	0.692	0.612	0.528	0.450	0.389	0.331	0.276	0.223	0.173	0.126	0.081	0.039
8.00	0.03997	0.996	0.968	0.907	0.840	0.767	0.687	0.603	0.514	0.444	0.383	0.326	0.272	0.220	0.171	0.124	0.080	0.039
16.00	0.02000	0.996	0.977	0.914	0.844	0.767	0.685	0.598	0.506	0.441	0.381	0.324	0.270	0.219	0.170	0.124	0.080	0.039
32.00	0.01000	0.996	0.982	0.917	0.846	0.768	0.685	0.596	0.504	0.440	0.380	0.323	0.270	0.219	0.170	0.124	0.080	0.039
64.00	0.00500	0.996	0.984	0.919	0.847	0.768	0.684	0.595	0.503	0.439	0.379	0.323	0.269	0.218	0.170	0.123	0.080	0.038
128.00	0.00250	0.996	0.985	0.920	0.847	0.769	0.684	0.594	0.503	0.439	0.379	0.323	0.269	0.218	0.170	0.123	0.080	0.038
256.00	0.00125	0.996	0.985	0.920	0.848	0.769	0.684	0.594	0.502	0.439	0.379	0.323	0.269	0.218	0.170	0.123	0.080	0.038
512.00	0.00062	0.996	0.985	0.921	0.848	0.769	0.684	0.593	0.502	0.439	0.379	0.323	0.269	0.218	0.170	0.123	0.080	0.038

(i-3) Wall half-angle, -20°

0.14	0.62303	1.017	1.025	1.027	1.022	1.011	0.994	0.972	0.945	0.915	0.881	0.852	0.822	0.790	0.758	0.724	0.689	0.653
0.25	0.45795	1.003	0.996	0.977	0.951	0.921	0.887	0.848	0.803	0.752	0.694	0.627	0.549	0.466	0.378	0.284	0.186	0.090
0.50	0.26963	0.995	0.964	0.928	0.886	0.838	0.784	0.725	0.659	0.587	0.516	0.447	0.379	0.311	0.244	0.179	0.116	0.056
1.00	0.13865	0.996	0.986	0.951	0.895	0.834	0.766	0.693	0.615	0.544	0.476	0.410	0.345	0.282	0.221	0.161	0.105	0.051
2.00	0.06983	0.996	0.985	0.966	0.910	0.838	0.761	0.677	0.601	0.531	0.464	0.399	0.336	0.274	0.215	0.157	0.102	0.049
4.00	0.03498	0.996	0.985	0.966	0.921	0.843	0.758	0.670	0.597	0.527	0.460	0.395	0.333	0.272	0.213	0.156	0.101	0.049
8.00	0.01750	0.996	0.985	0.966	0.928	0.846	0.758	0.669	0.595	0.525	0.458	0.394	0.331	0.271	0.212	0.155	0.101	0.049
16.00	0.00875	0.996	0.985	0.966	0.933	0.848	0.757	0.668	0.594	0.524	0.458	0.393	0.331	0.270	0.212	0.155	0.101	0.049
32.00	0.00437	0.996	0.985	0.966	0.935	0.849	0.757	0.668	0.594	0.524	0.457	0.393	0.331	0.270	0.212	0.155	0.101	0.049
64.00	0.00219	0.996	0.985	0.966	0.936	0.850	0.757	0.668	0.593	0.524	0.457	0.393	0.330	0.270	0.212	0.155	0.101	0.049
128.00	0.00109	0.996	0.985	0.966	0.937	0.850	0.757	0.668	0.593	0.524	0.457	0.393	0.330	0.270	0.211	0.155	0.101	0.049
256.00	0.00055	0.996	0.985	0.966	0.937	0.850	0.757	0.668	0.593	0.524	0.457	0.393	0.330	0.270	0.211	0.155	0.101	0.049
512.00	0.00027	0.996	0.985	0.966	0.937	0.850	0.757	0.668	0.593	0.524	0.457	0.393	0.330	0.270	0.211	0.155	0.101	0.049

TABLE II. - Continued. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(j) Length to inlet width ratio, 2.00

(j-1) Wall half-angle, -5°

Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.34	0.44358	1.018	1.029	1.033	1.031	1.022	1.008	0.989	0.965	0.937	0.905	0.871	0.833	0.793	0.751	0.707	0.660	0.613
0.50	0.37201	1.011	1.014	1.009	0.998	0.981	0.959	0.935	0.895	0.830	0.758	0.676	0.581	0.485	0.394	0.297	0.195	0.093
1.00	0.24471	1.002	0.995	0.983	0.917	0.842	0.760	0.672	0.576	0.495	0.425	0.361	0.301	0.243	0.188	0.135	0.086	0.041
2.00	0.14770	0.998	0.927	0.848	0.762	0.671	0.574	0.491	0.426	0.369	0.317	0.268	0.223	0.179	0.138	0.100	0.064	0.031
4.00	0.08399	0.927	0.845	0.756	0.662	0.562	0.476	0.414	0.361	0.313	0.268	0.227	0.189	0.152	0.117	0.085	0.054	0.026
8.00	0.04246	0.948	0.853	0.753	0.646	0.535	0.462	0.402	0.351	0.304	0.261	0.222	0.184	0.148	0.115	0.083	0.053	0.026
16.00	0.02125	0.966	0.864	0.755	0.640	0.529	0.458	0.399	0.348	0.302	0.260	0.220	0.183	0.148	0.114	0.083	0.053	0.026
32.00	0.01062	0.976	0.869	0.756	0.637	0.527	0.456	0.397	0.347	0.301	0.259	0.219	0.182	0.147	0.114	0.083	0.053	0.026
64.00	0.00531	0.982	0.872	0.756	0.635	0.525	0.455	0.397	0.346	0.300	0.258	0.219	0.182	0.147	0.114	0.083	0.053	0.026
128.00	0.00266	0.985	0.874	0.757	0.634	0.525	0.454	0.396	0.346	0.300	0.258	0.219	0.182	0.147	0.114	0.083	0.053	0.026
256.00	0.00133	0.986	0.875	0.757	0.633	0.524	0.454	0.396	0.346	0.300	0.258	0.219	0.182	0.147	0.114	0.082	0.053	0.026
512.00	0.00066	0.987	0.875	0.757	0.633	0.524	0.454	0.396	0.346	0.300	0.258	0.219	0.182	0.147	0.114	0.082	0.053	0.026

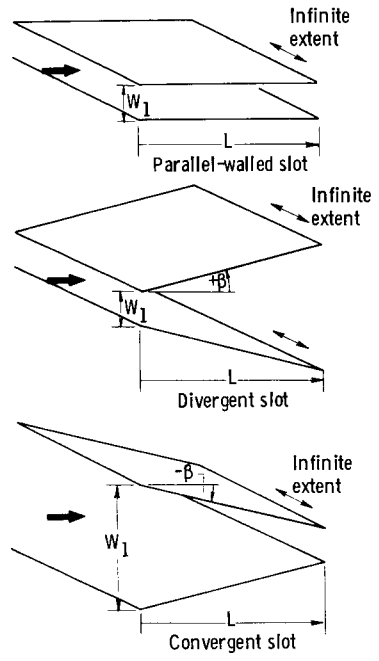
(j-2) Wall half-angle, -10°

0.14	0.50271	1.020	1.032	1.036	1.033	1.024	1.008	0.988	0.962	0.932	0.899	0.862	0.823	0.781	0.738	0.696	0.654	0.611
0.25	0.37897	1.008	1.006	0.996	0.979	0.948	0.895	0.838	0.774	0.704	0.626	0.549	0.474	0.397	0.317	0.235	0.152	0.072
0.50	0.24323	0.958	0.951	0.891	0.825	0.754	0.677	0.598	0.529	0.465	0.405	0.347	0.291	0.236	0.184	0.133	0.086	0.041
1.00	0.13865	0.962	0.890	0.811	0.727	0.638	0.561	0.496	0.437	0.383	0.332	0.283	0.237	0.192	0.149	0.108	0.070	0.034
2.00	0.06983	0.996	0.922	0.821	0.714	0.619	0.545	0.482	0.425	0.372	0.322	0.274	0.229	0.186	0.144	0.105	0.068	0.033
4.00	0.03498	0.996	0.949	0.828	0.704	0.612	0.539	0.476	0.420	0.367	0.318	0.271	0.227	0.184	0.143	0.104	0.067	0.032
8.00	0.01750	0.996	0.967	0.833	0.701	0.610	0.537	0.474	0.418	0.366	0.317	0.270	0.226	0.183	0.143	0.104	0.067	0.032
16.00	0.00875	0.996	0.978	0.835	0.700	0.608	0.535	0.473	0.417	0.365	0.316	0.270	0.225	0.183	0.142	0.104	0.067	0.032
32.00	0.00437	0.996	0.984	0.837	0.699	0.608	0.535	0.472	0.416	0.364	0.316	0.269	0.225	0.183	0.142	0.104	0.067	0.032
64.00	0.00219	0.996	0.985	0.837	0.699	0.608	0.535	0.472	0.416	0.364	0.315	0.269	0.225	0.183	0.142	0.104	0.067	0.032
128.00	0.00109	0.996	0.985	0.838	0.699	0.607	0.534	0.472	0.416	0.364	0.315	0.269	0.225	0.183	0.142	0.104	0.067	0.032
256.00	0.00055	0.996	0.985	0.838	0.699	0.607	0.534	0.472	0.416	0.364	0.315	0.269	0.225	0.183	0.142	0.104	0.067	0.032
512.00	0.00027	0.996	0.985	0.838	0.699	0.607	0.534	0.472	0.416	0.364	0.315	0.269	0.225	0.183	0.142	0.104	0.067	0.032

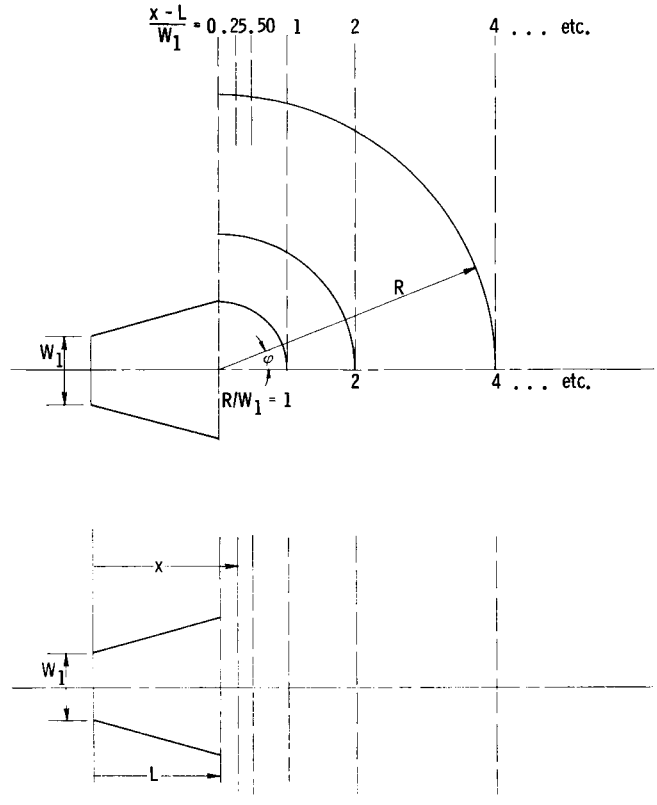
TABLE II. - Concluded. CALCULATED DISTRIBUTIONS OF PARTICLE FLUX AT VARIOUS RADIAL DISTANCES FROM SLOT EXIT

(k) Length to inlet width ratio, 4.00; wall half-angle, -5°

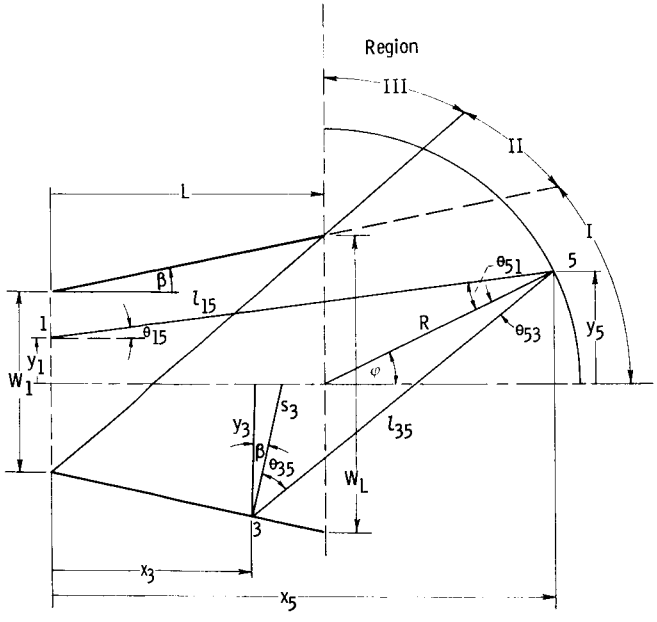
Radial distance from slot exit, R/W_1	Centerplane flux relative to inlet flux, $n(0)/n_1$	Angle from centerplane, φ, deg																
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Flux relative to centerplane, $n(\varphi)/n(0)$																
0.18	0.35983	1.019	1.030	1.033	1.029	1.019	1.003	0.981	0.954	0.923	0.888	0.850	0.809	0.765	0.719	0.671	0.621	0.570
0.25	0.31449	1.013	1.017	1.012	1.001	0.983	0.959	0.932	0.902	0.833	0.744	0.648	0.560	0.478	0.395	0.305	0.204	0.098
0.50	0.21760	1.003	0.997	0.984	0.906	0.797	0.682	0.584	0.507	0.441	0.382	0.325	0.272	0.220	0.171	0.123	0.079	0.037
1.00	0.14070	0.998	0.895	0.768	0.635	0.536	0.463	0.404	0.353	0.307	0.264	0.224	0.186	0.150	0.116	0.084	0.054	0.026
2.00	0.08694	0.877	0.733	0.585	0.483	0.413	0.359	0.314	0.274	0.238	0.205	0.174	0.145	0.117	0.090	0.065	0.042	0.020
4.00	0.04495	0.892	0.708	0.549	0.456	0.392	0.341	0.298	0.261	0.227	0.195	0.166	0.138	0.111	0.086	0.062	0.040	0.019
8.00	0.02249	0.924	0.702	0.542	0.451	0.388	0.338	0.296	0.259	0.225	0.194	0.165	0.137	0.111	0.086	0.062	0.040	0.019
16.00	0.01125	0.945	0.696	0.539	0.449	0.386	0.336	0.295	0.258	0.224	0.193	0.164	0.136	0.110	0.085	0.062	0.040	0.019
32.00	0.00562	0.958	0.692	0.537	0.448	0.385	0.336	0.294	0.257	0.224	0.193	0.164	0.136	0.110	0.085	0.062	0.040	0.019
64.00	0.00281	0.965	0.691	0.537	0.448	0.385	0.335	0.294	0.257	0.224	0.193	0.164	0.136	0.110	0.085	0.062	0.040	0.019
128.00	0.00141	0.969	0.691	0.537	0.447	0.385	0.335	0.294	0.257	0.224	0.193	0.164	0.136	0.110	0.085	0.062	0.040	0.019
256.00	0.00070	0.971	0.691	0.536	0.447	0.384	0.335	0.294	0.257	0.224	0.193	0.164	0.136	0.110	0.085	0.062	0.040	0.019
512.00	0.00035	0.972	0.691	0.536	0.447	0.384	0.335	0.294	0.257	0.224	0.193	0.164	0.136	0.110	0.085	0.062	0.040	0.019



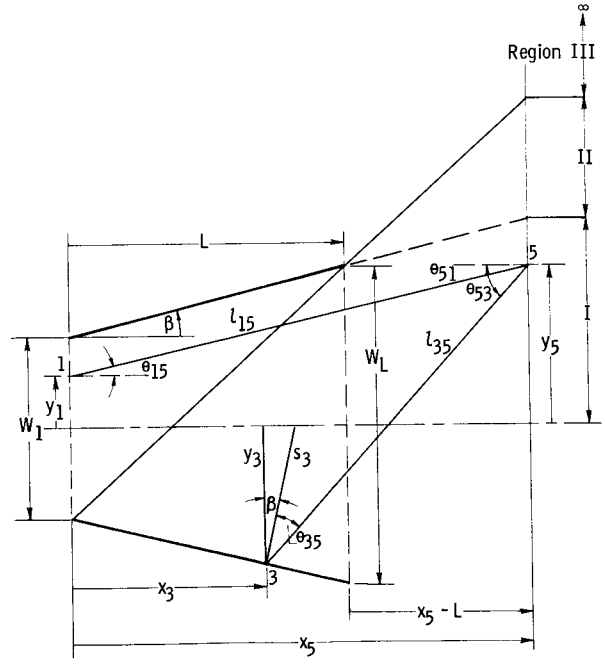
(a) Illustration of configurations investigated.



(b) Illustration of location of planes and cylindrical surfaces at which flux patterns are calculated.



(c) Parameters in radial flux relations.



(d) Parameters in planar flux relations.

Figure 1. - Schematic diagrams.

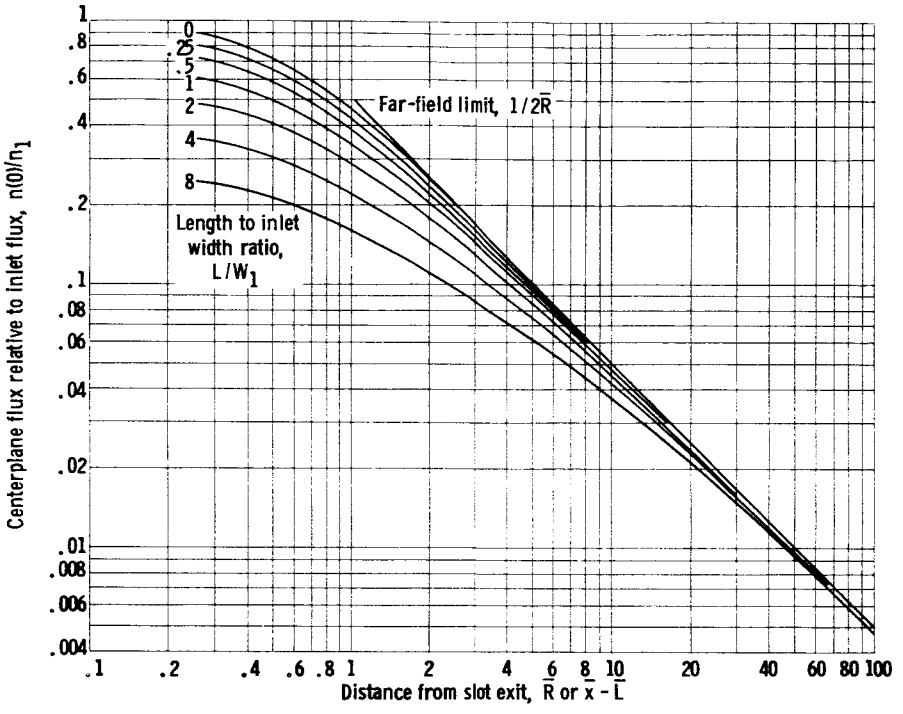


Figure 2. - Variation of centerplane flux with distance from exit aperture for parallel-walled slot.

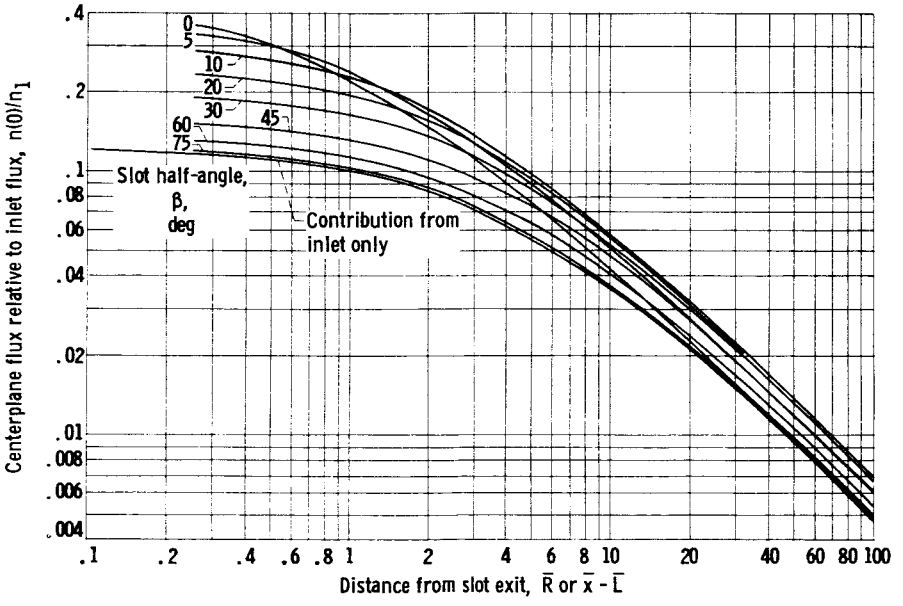


Figure 3. - Variation of centerplane flux with distance from exit aperture. Length to inlet width ratio, 4.

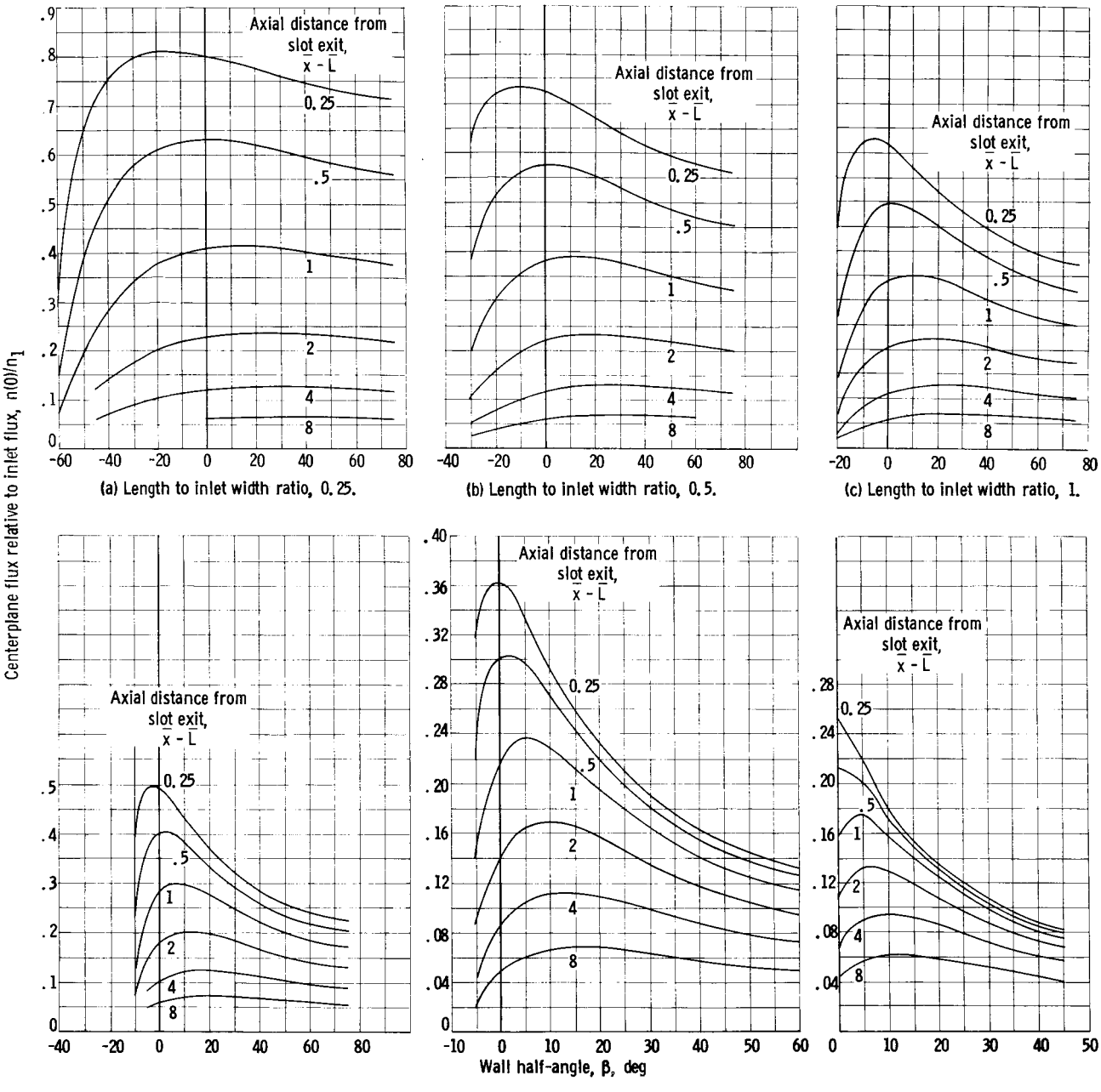


Figure 4. - Variation of centerplane flux with wall half-angle at various distances from exit aperture.

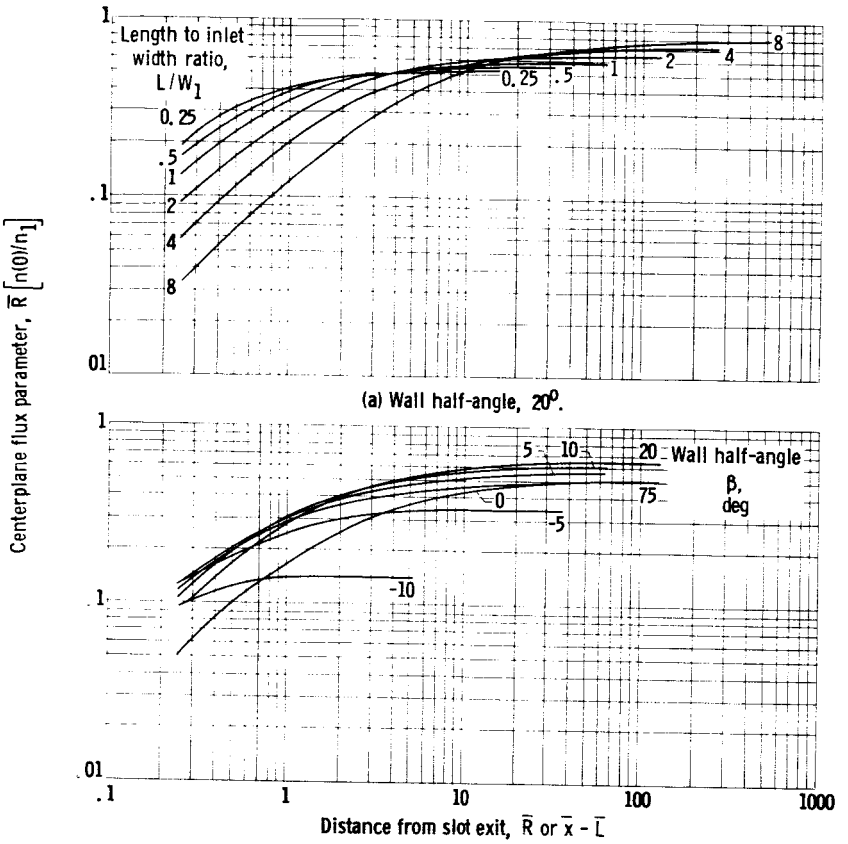


Figure 5. - Variation of centerplane flux parameter with distance from slot exit.

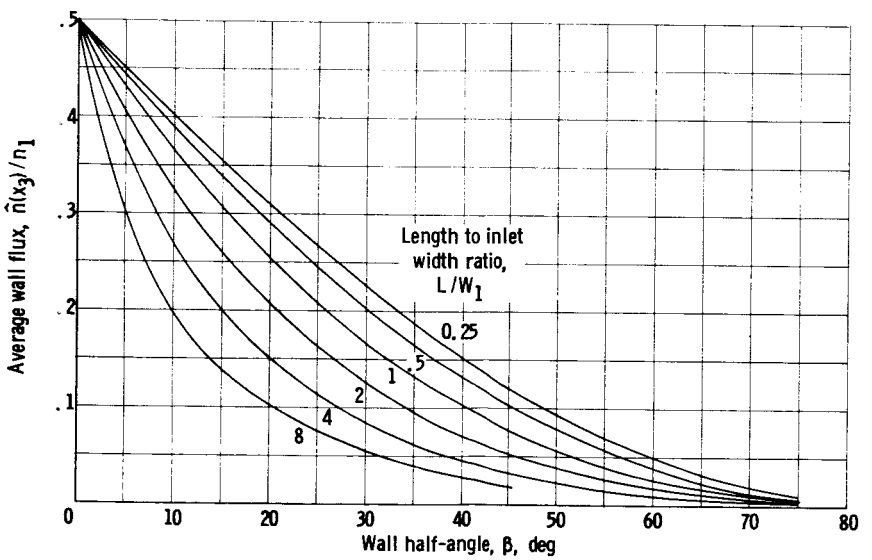


Figure 6. - Average wall flux values for slots of varying length to initial width ratios and wall half-angle.

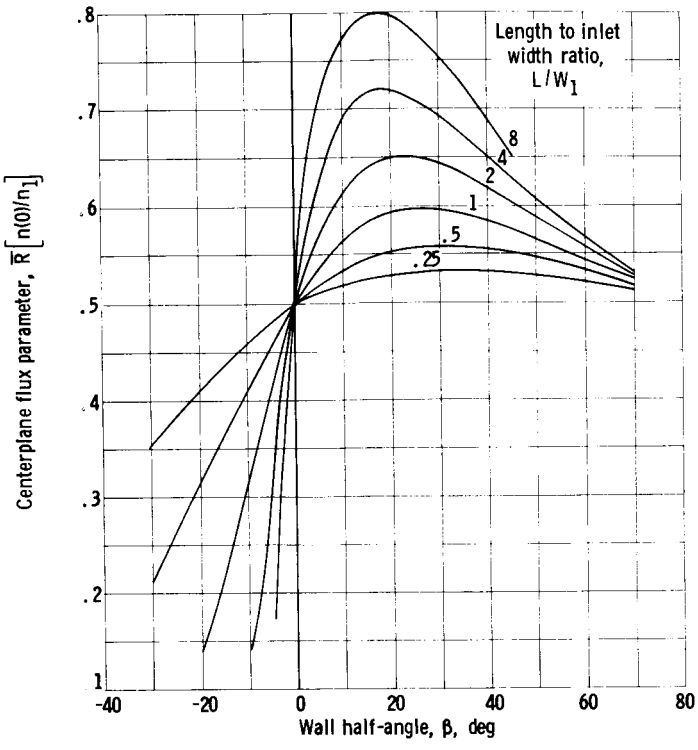


Figure 7. - Variation of limiting value of centerplane flux parameter with wall half-angle and slot length to inlet width ratio.

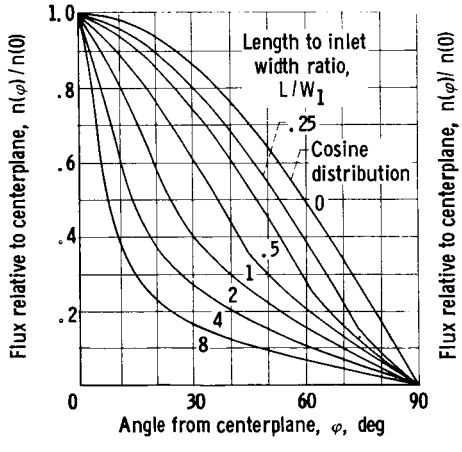
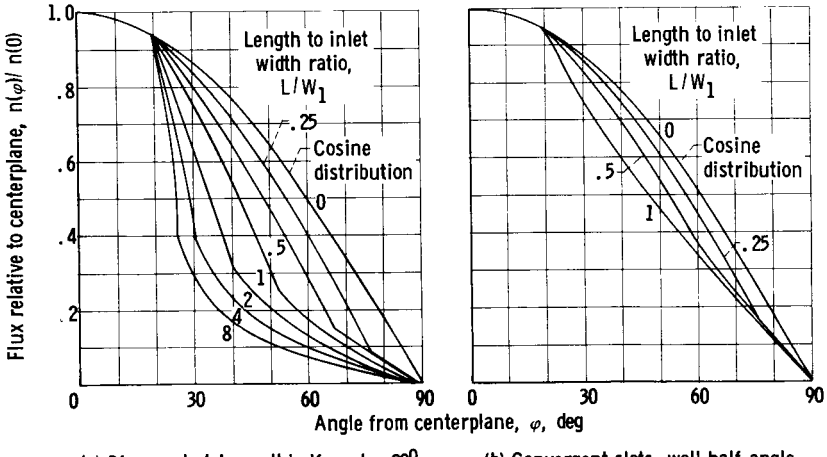


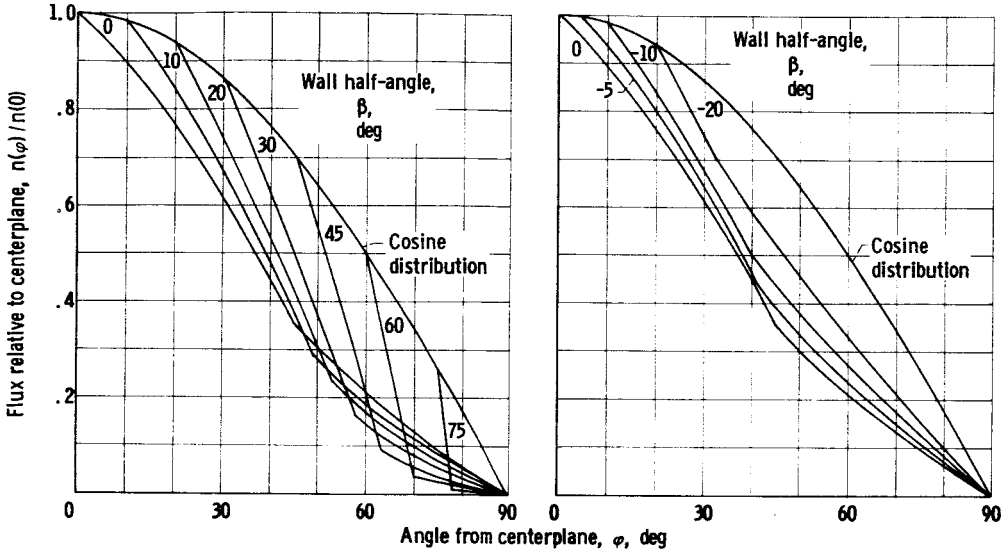
Figure 8. - Far-field flux patterns for parallel-walled slots (wall half-angle = 0) and various length to inlet width ratios.



(a) Divergent slots; wall half-angle, 20^0.

(b) Convergent slots; wall half-angle, -20^0.

Figure 9. - Far-field flux patterns for slots with 20^0 wall-half angle and various length to inlet width ratios.



(a) Divergent slots. (b) Convergent slots.

Figure 10. - Far-field flux patterns for slots with length to inlet width ratio of 1 and varying wall half-angles.

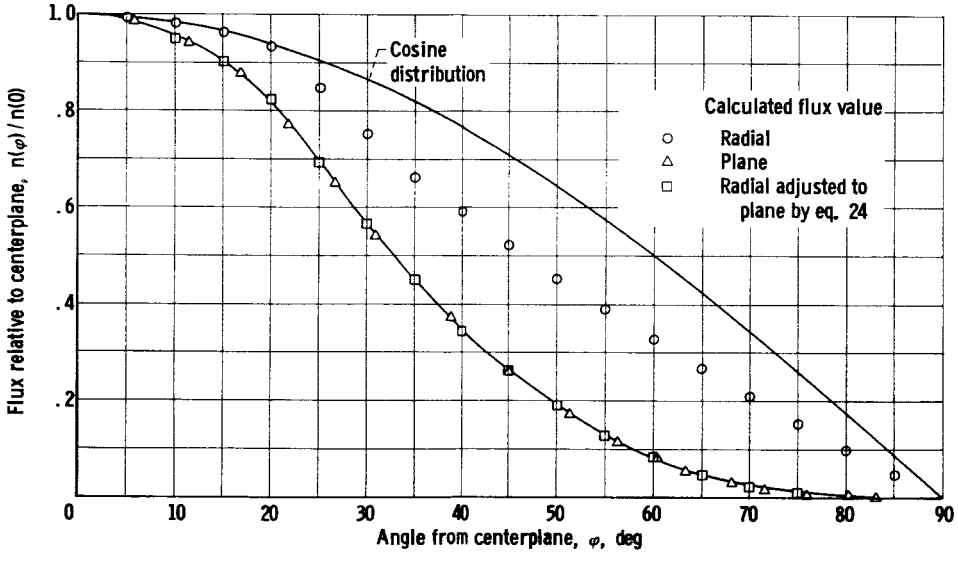
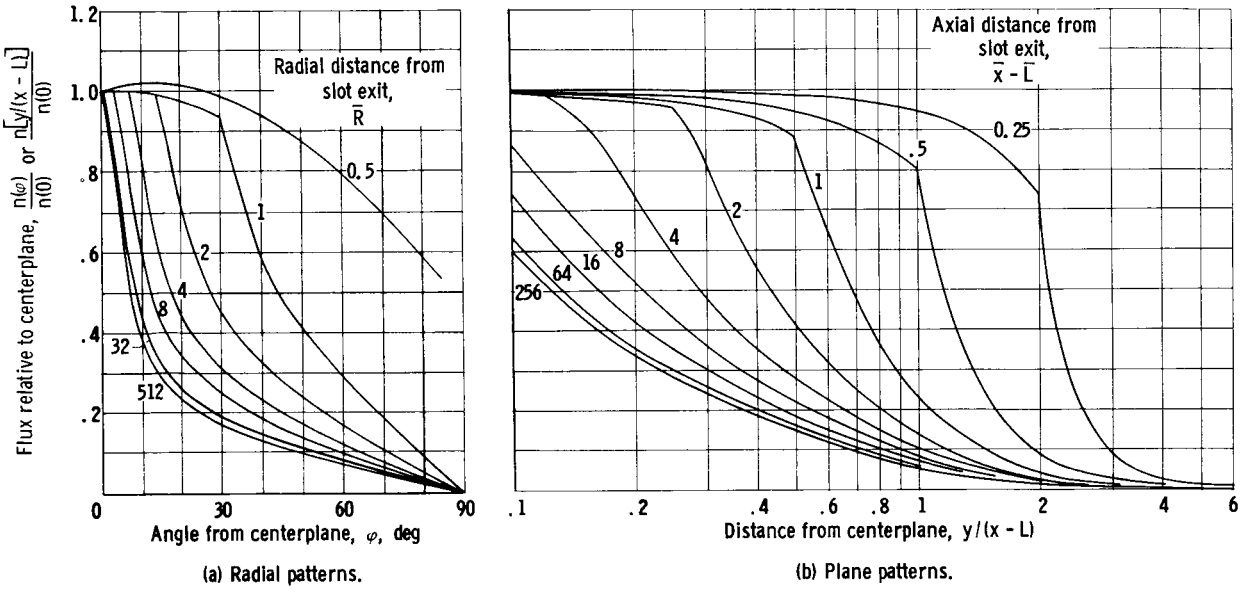


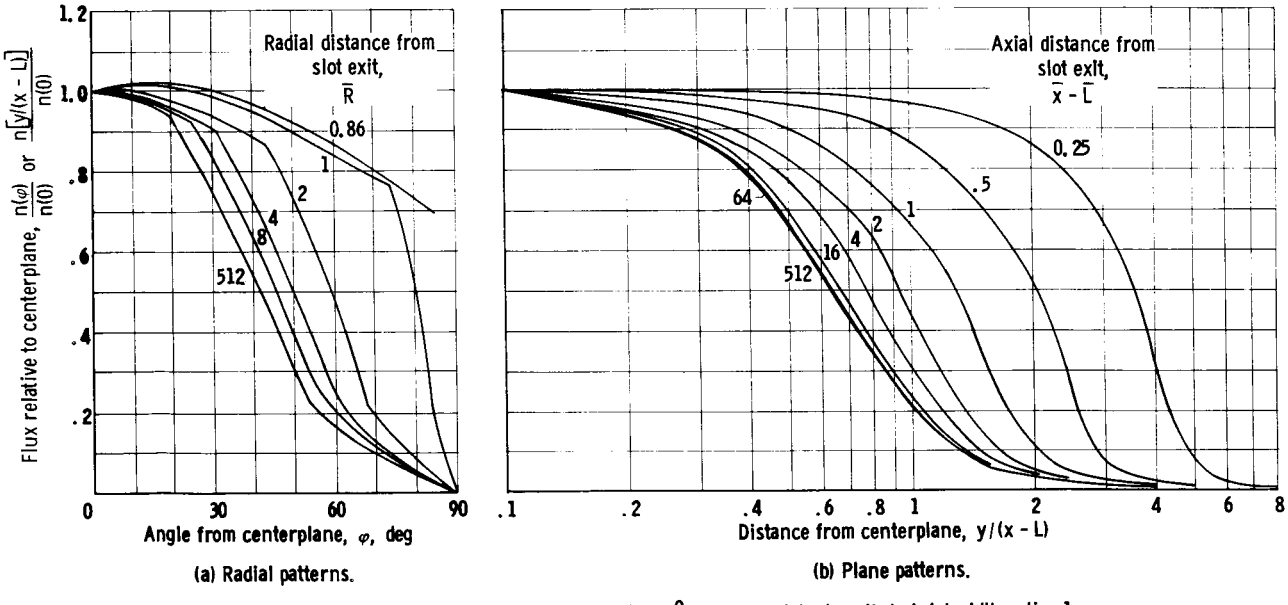
Figure 11. - Comparison of radial and planar flux patterns in far field. Length to inlet width ratio, 1; wall half-angle, -20^0.



(a) Radial patterns.

(b) Plane patterns.

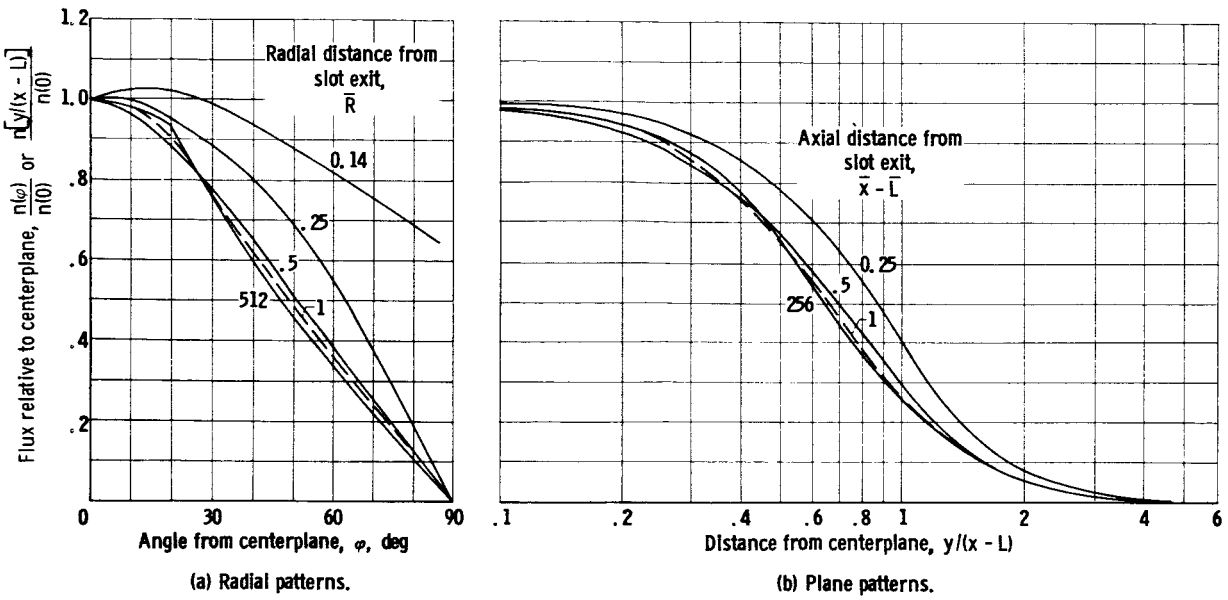
Figure 12. - Variation of flux patterns with distance from slot exit. Length to inlet width ratio, 8; wall half-angle, 0.



(a) Radial patterns.

(b) Plane patterns.

Figure 13. - Variation of flux patterns for 20^0 divergent slot. Length to inlet width ratio, 1.



(a) Radial patterns.

(b) Plane patterns.

Figure 14. - Variation of flux patterns for 20^0 convergent slot. Length to inlet width ratio, 1.

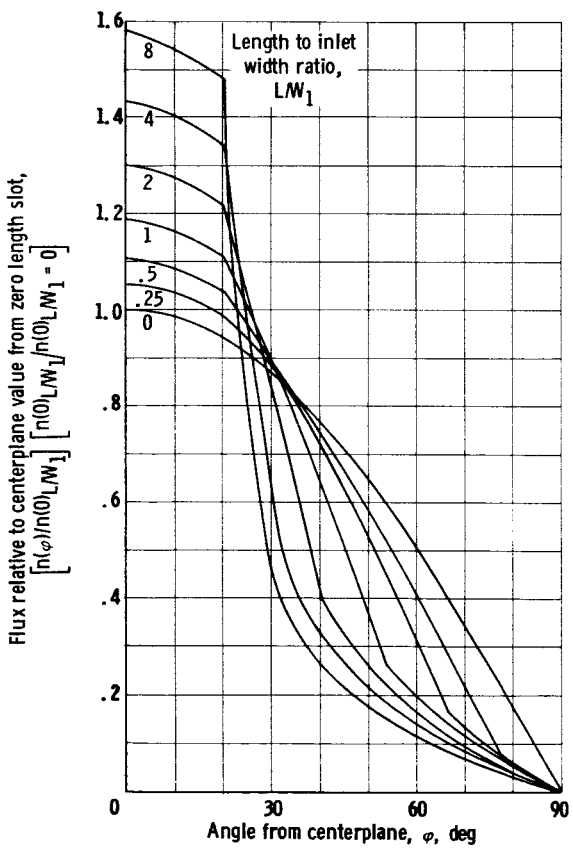


Figure 15. - Comparison of far-field relative flux from slots of different length to inlet width ratios.

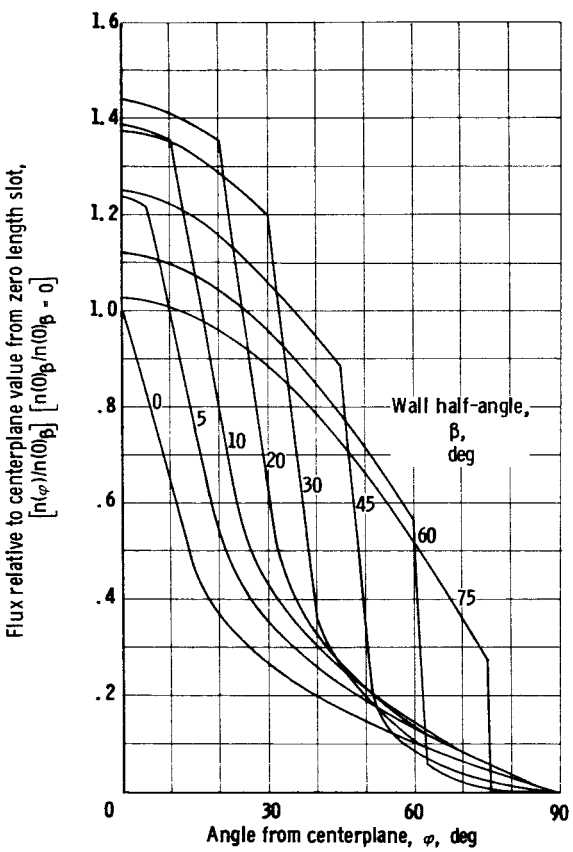


Figure 16. - Comparison of relative flux from slots of different wall half-angles. Length to inlet width ratio, 4.